

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-1 of 7-16

## 7. HYDRAULIC LINE REPLACEMENT

### 7.1 Summary

#### 7.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd<sup>3</sup> of radioactively contaminated waste from OU 7-10 (Pit 9) using a standard commercial backhoe modified to operate through the RCS wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

This project incorporates an RCS located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. Packaging Glovebox Systems are attached directly to the confinement structure and are fed by track-guided transfer carts.

A standard CAT 446B backhoe will perform soil excavation, probe removal, 55-gal drum removal (using a jaw bucket design), and core sampling. As shown in Figure 7-1, the backhoe cab and loader are located outside the RCS while the boom, stick, and various end effectors are located inside the RCS (contaminated side).

The environment within the RCS is highly aggressive. Carbon tetrachloride at a concentration up to 1,000 ppm is estimated within the RCS during waste excavation. Carbon tetrachloride will condense on the backhoe boom, stick, and end effectors attacking susceptible materials. The standard Caterpillar flexible hydraulic lines, attached to the boom and stick, are constructed of materials that are susceptible to attack within the RCS environment. To negate hydraulic line failure within the RCS during waste excavation, all of the hydraulic lines within the RCS shall be replaced with Parker hydraulic lines comprised of fluorinated elastomers and rated for a working pressure of 4,000 lb. Teflon hydraulic hoses (comprised of tetrafluoroethylene [C<sub>2</sub>F<sub>4</sub>]) shall replace all hydraulic hoses leading to and from the boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, boom pivot cylinders, and locking check valves as shown on contract Drawing 519931, "OU 7-10 Glovebox Excavator Method Project Excavator Modifications WSE (Western States Equipment) Modifications." Additionally, the Teflon hydraulic hoses shall be used for the shared hydraulic hoses leading to and from the quick disconnects for the jaw bucket and hydraulic

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-2 of 7-16

hammer, the whip hoses for the jaw bucket and hydraulic hammer, and the hydraulic coupler cylinder hose as shown on contract Drawing 519931.

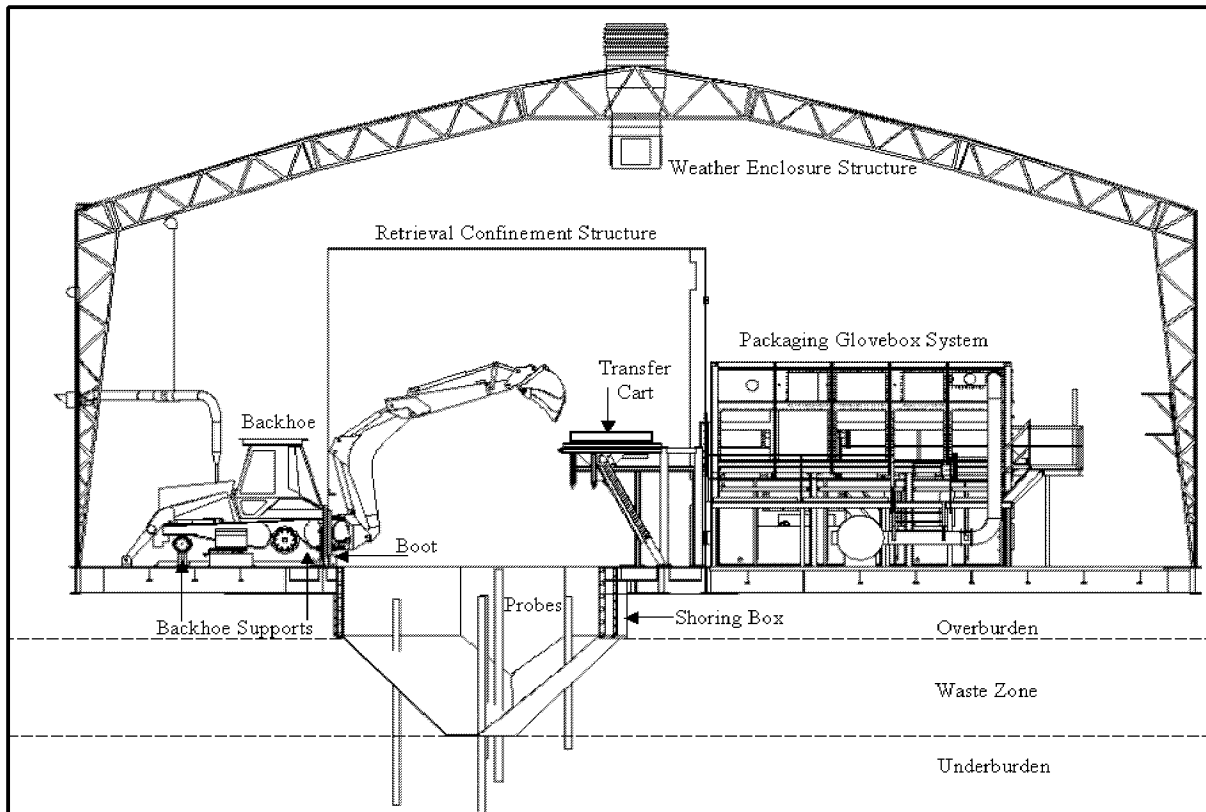


Figure 7-1. Cross section of the OU 7-10 Glovebox Excavator Method Project Facility.

Prior to installation, all of the hoses located within the RCS shall be pressure tested at 1.25 times the rated working pressure to ensure integrity during waste excavation.

### 7.1.2 Work Included

This specification covers the requirements of the Subcontractor and equipment supplier for the purchase, fabrication, assembly, installation, and testing of the Parker Teflon hydraulic hoses and associated hardware. These new hoses shall be run to and from the CAT 446B boom cylinder, stick cylinder, stick extension cylinder, bucket cylinder, boom pivot cylinders, hydraulic coupler cylinder, quick disconnects for the jaw bucket and hydraulic hammer, jaw bucket whip hoses, and hydraulic hammer whip hoses. Additionally, the Parker Teflon hydraulic hoses and associated hardware shall be run to and from locking check

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 7-3 of 7-16

valves (discussed in another specification within this specification package). It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and the standard practices of equipment supplier and Subcontractor's standard practices when such practices do not conflict with this specification.

Teflon hydraulic hoses and all associated hardware shall be completely assembled and installed on the CAT 446B backhoe at the Subcontractor facility.

The following shall be delivered to the Idaho National Engineering and Environmental Laboratory (INEEL):

1. Teflon hydraulic hoses and all associated hardware, installed on the CAT 446B backhoe, starting at the backhoe inner boot (vertical plate welded to the inner frame between the backhoe valve body and the large frame opening from which the hydraulic hoses exit the frame) and encompassing the entire boom assembly, stick assembly, and end effectors as shown on contract Drawing 519931
2. Spare hydraulic hoses for accessible hydraulic hose replacement
3. Vendor data submittals in accordance with vendor data schedule and this specification.

#### **7.1.3 Work Not Included**

None identified.

#### **7.1.4 INEEL-Furnished Materials, Equipment, and Services**

The INEEL will furnish the CAT 446B backhoe loader.

### **7.2 Applicable Codes, Procedures, And References**

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-4 of 7-16

### 7.2.1 National and Local Codes

Occupational Safety and Health Administration (OSHA):

- OSHA 29 CFR 1910, "Occupational Safety and Health Standards."

### 7.2.2 Industry Procedures and DOE Orders

American Institute of Steel Construction, LRFD Manual of Steel Construction

American Society of Testing and Materials (ASTM):

- ASTM A36, "Standard Specification for Carbon Structural Steel"
- ASTM A570, "Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled"
- ASTM A325, "Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength."

Society of Automotive Engineers (SAE):

- SAE J31, "Hydraulic Backhoe Lift Capacity"
- SAE J1097, "Hydraulic Excavator Lift Capacity Calculation and Test Procedure"
- SAE J1179, "Hydraulic Excavator and Backhoe Digging Forces." (This specification is provided for reference only. It is not a requirement.)

### 7.2.3 Military (National) Specification

Not applicable.

### 7.2.4 Related Specifications

Not applicable.

### 7.2.5 References

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-5 of 7-16

### **7.3 Technical Requirements**

#### **7.3.1 General**

The hydraulic lines shall be modified by the Subcontractor to provide a fully functional system and to perform as specified in a safe and efficient manner. This section defines the fabrication and installation requirements for the Teflon hydraulic hose replacement.

#### **7.3.2 Restrictions**

None identified.

#### **7.3.3 Performance Requirements**

All hydraulic hoses shall be tested at 1.25 times the rated working pressure before installation onto the CAT 446B backhoe.

All hydraulic lines shall be capable of delivering the proper flow of hydraulic fluid to each destination at the appropriate pressure.

#### **7.3.4 Software**

Not applicable.

#### **7.3.5 Registered Professional Engineer Certification**

Not applicable.

#### **7.3.6 Human Factors**

Not applicable.

#### **7.3.7 Reliability and Maintainability**

##### **7.3.7.1 Reliability**

All Teflon hydraulic hose fittings and connections shall be of a quality that the expected mean time between failures for this system shall not be less than 1,080 hours.

The hydraulic hose assembly shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-6 of 7-16

#### 7.3.7.2 Maintainability

The hydraulic hose assembly shall maintain the original CAT 446B hydraulic hose configuration to facilitate ease of inspecting, servicing, and maintaining equipment to the extent possible.

Standard replacement parts for the hydraulic hose assembly, as shown on manufacturer's recommendations, shall be readily available for routine maintenance activities.

#### 7.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

#### 7.3.9 Natural Phenomena Requirements

Not applicable.

### 7.4 Environmental, Safety, And Health Requirements

#### 7.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements as stated in 29 CFR 1910.

#### 7.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

#### 7.4.3 Emergency Response

Not applicable.

#### 7.4.4 Accident Investigation

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-7 of 7-16

## **7.5 Manufacturing And Assembly**

### **7.5.1 General**

The hydraulic hose assembly shall be assembled and installed on a CAT 446B backhoe in the Subcontractor's shop to ensure proper fit and operation. The technical representative for the Contractor (or alternate) will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor facility.

### **7.5.2 Prohibitions**

None identified.

### **7.5.3 Material**

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in standard commercial practices of the equipment manufacturer. Materials shall be as delineated on contract drawings.

### **7.5.4 Fabrication**

Not applicable.

### **7.5.5 Equipment Tagging**

Not applicable.

### **7.5.6 Cleaning, Painting, and Coating**

All hydraulic hose assemblies shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed.

### **7.5.7 Spare Parts**

Additional hoses shall be supplied for repair. Each hose shall be labeled with location identification and cross referenced to the spare parts list. Some hoses may be used in several locations. When this situation exists, supply one hose and identify the locations it may be used for. Each location shall have a spare hose supplied.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-8 of 7-16

#### **7.5.8 Other Processes**

Not applicable.

### **7.6 Submittals**

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

#### **7.6.1 General Submittal Requirements**

##### **7.6.1.1 General Procedures**

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

##### **7.6.1.2 Vendor Data Schedule**

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, drawing or specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-9 of 7-16

file submittals is required. Additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

7.6.1.3 Vendor Data Transmittal and Disposition Form 431.13, “Construction Vendor Data Transmittal & Disposition Form.”

All vendor data shall be submitted to the Contractor using the Form 431.13. The form provides a method for the Subcontractor to submit vendor data and provides a means for the Contractor to disposition the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), the drawing or specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

7.6.1.4 Disposition by the Contractor

Comments from the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 7-10 of 7-16

1. Submittal requires corrections shown on comments before final review
2. Submittal data incomplete and requires more detailed information before final review
3. Submittal data does not meet subcontract document requirements.

**D. Accepted for Use. Information Only Submittal:**  
Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Mandatory approval coded vendor data will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. A-, B-, and C-coded dispositioned submittals will be returned to the Subcontractor. D dispositioned submittals will not be returned to the Subcontractor. The Contractor may provide internal review of information only submittals. In the event that comments are generated on an information only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

## **7.6.2 Spare Parts and Special Tools List**

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the hydraulic hoses and associated fittings. This list shall include all corresponding suppliers of each component and their phone numbers.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-11 of 7-16

### **7.6.3 Operating and Maintenance Manuals**

The operations and maintenance manual shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for the installation shall be included and incorporated in the manual.

### **7.6.4 Drawings**

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the Parker Teflon hydraulic lines mounted on the 446B backhoe. These drawings shall document the location for hose replacement with spares.

### **7.6.5 Software**

Not applicable.

### **7.6.6 Inspection Test Plans, Procedures, Reports**

Inspection of test plans, procedures, and reports includes the following:

- **Performance test procedures (Subcontractor preshipment):**  
Performance test procedures and reports as outlined in Section 7.7.4.1 of this specification.
- **Performance test reports (Subcontractor preshipment):**  
Performance test results and reports as outlined in Section 7.7.4.2 of this specification.

## **7.7 Quality Assurance**

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

### **7.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel**

The hydraulic hoses shall be assembled and installed by a firm that has prior related experience pertaining to the installation of hydraulic hoses along the boom, stick, and end effectors of a CAT 446B backhoe.

The hydraulic hoses shall be tested at design pressures by a firm that has prior related experience pertaining to the pressure testing of hydraulic hoses.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-12 of 7-16

All replacement hoses shall have pressure ratings at or above the hoses they replace.

#### **7.7.2 QA Program**

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

#### **7.7.3 Nondestructive Examination**

Not applicable.

#### **7.7.4 Operational Testing**

##### **7.7.4.1 Performance Test Procedures (Subcontractor Preshipment)**

The equipment supplier or Subcontractor shall submit to the Contractor an in-shop testing plan and procedure before demonstration of a full hydraulic function test at the facility of the equipment supplier or Subcontractor. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The Subcontractor shall inform the Contractor one week in advance of performance testing so that a Contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all hydraulic lines operate within standard and elevated parameters as defined within this specification.

Testing acceptance criteria:

- Test uninstalled hydraulic hose and fitting integrity at 1.25 times the rated working pressure.
- Test installed hose integrity during full hydraulic pressure demonstration. No damage or leakage allowed.
- Boom, stick, and bucket shall be operated at full strokes.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-13 of 7-16

7.7.4.2 Performance Test Reports (Subcontractor Preshipment)

The Subcontractor shall submit to the Contractor the in-shop testing results following the demonstration of hydraulic hose integrity at the facility of the equipment supplier or Subcontractor.

**7.7.5 Special Processes**

Not applicable.

**7.8 Packaging and Shipping**

**7.8.1 Packing and Packaging**

Not applicable.

**7.8.2 Marking and Handling**

Not applicable.

**7.8.3 Special Transportation Requirements**

Not applicable.

**7.9 Installation and Maintenance**

**7.9.1 Installation**

The Teflon hydraulic hose assembly shall be installed on the CAT 446B backhoe at the Subcontractor's facility.

**7.9.2 Startup and Calibration**

Not applicable.

**7.9.3 Training**

Not applicable.

**7.9.4 Maintenance**

The hydraulic hose assembly manufactures shall provide recommended maintenance instructions for all hydraulic hoses and all associated equipment.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-14 of 7-16

#### **7.10 Marking and Identification**

Not applicable.

#### **7.11 Acceptance**

##### **7.11.1 Final Acceptance Method**

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

##### **7.11.2 Inspection and Hold Point**

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least five working days in advance of the time that the hydraulic lines shall be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

##### **7.11.3 INEEL Surveillance and Audits**

The authorized Contractor representative may perform source inspection or surveillance.

#### **7.12 Attachments**

Vendor Data Schedule- Form 431.14.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	7-15 of 7-16

431.14  
08/01/2001  
Rev. 03

## Vendor Data Schedule

**Project Title** OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE  
MODIFICAION - HYDRAULIC LINE REPLACEMENT

**Project No.** 021052 -  
22001

**System Engineer/  
Project Manager** DAVIES STEVEN A

**Date:** 12-APR-02

**Rev:** 1

**Vendor Data Coordinator  
Address**

POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualificaiton AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other

Specification  Environmental Restoration	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401 Revision: 1 Page: 7-16 of 7-16
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When to Submit						
AC - As Completed AT - After Test BC - Before Contract Awarded		BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off- Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal	
Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	2. Information Only
2	6.2		AK. Special Tools List	4	PS - Prior to Shipment	2. Information Only
3	6.3		L. O&M Manual	4	PS - Prior to Shipment	Information Only
4	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	1. Approval Required
5	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
6	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.  
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.  
3. The normal number of copies required is ONE. If more are required, the number will be shown here.  
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-1</b> of 8-20

## 8. LOCK CHECK VALVES

### 8.1 Summary

#### 8.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd<sup>3</sup> of radioactively contaminated waste from OU 7-0 (Pit 9) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

The Glovebox Excavator Method Project incorporates the Retrieval Confinement Structure located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The confinement structure is located within a larger fabric-skinned Weather Enclosure Structure. Packaging Glovebox Systems are attached directly to the confinement structure and are fed by track guided transfer carts protruding over the excavation area.

A standard 446B backhoe performs soil excavation, probe removal, 55-gallon drum removal (using a jaw bucket design), and core sampling (using a jackhammer/core sampler design). The backhoe cab and loader are located outside the RCS, while the boom, stick, and various end effectors are located inside the contaminated RCS (see Figure 8-1 and Figure 8-2).

Supporting the boom, stick, and bucket position during hydraulic line rupture or during an emergency situation is highly desirable. Hydraulic line rupture on the backhoe boom and stick are of paramount concern. If the boom or stick hydraulic lines were to rupture during waste excavation, the damage inflicted on a transfer cart frame by a falling boom would be unacceptable (see Figure 8-2). Additionally, the operator must stop the backhoe engine during an emergency situation. Stopping the engine disengages the hydraulic pump and prevents the boom from swinging left, right, and vertically upward. Disengaging the hydraulic pump does not prevent the boom (or stick) from dropping. When the backhoe engine is stopped, the hydraulic pressure is maintained at the elevated hydraulic pump pressure. If the operator control levers for the boom, stick, or bucket are manipulated while the engine is turned off, the hydraulic pressure is released in the corresponding part, and the part will swing downwards because of gravity. Damage from a falling boom,

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	8-2 of 8-20

stick, or bucket can be mitigated by installing lock check valves on the boom within close proximity to the hydraulic cylinder and as shown in contract drawings 519931 and Figure 8-2.

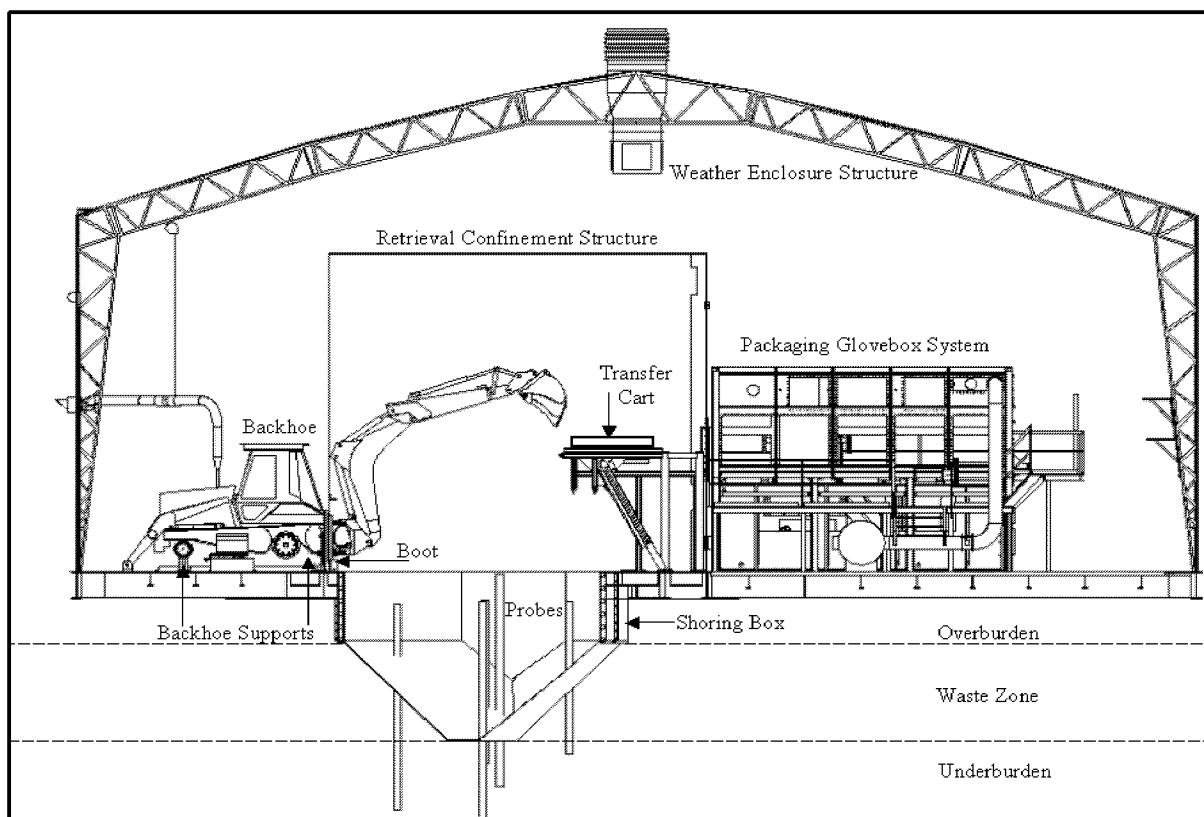


Figure 8-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental Restoration		Revision: 1
		Page: <b>8-3</b> of 8-20

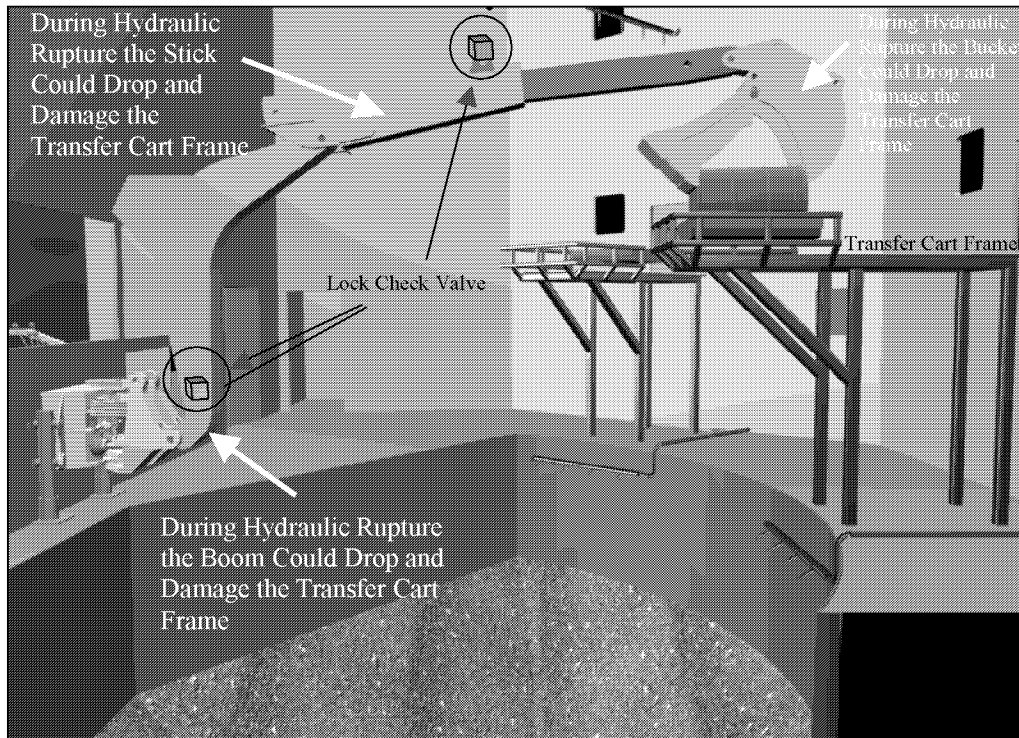
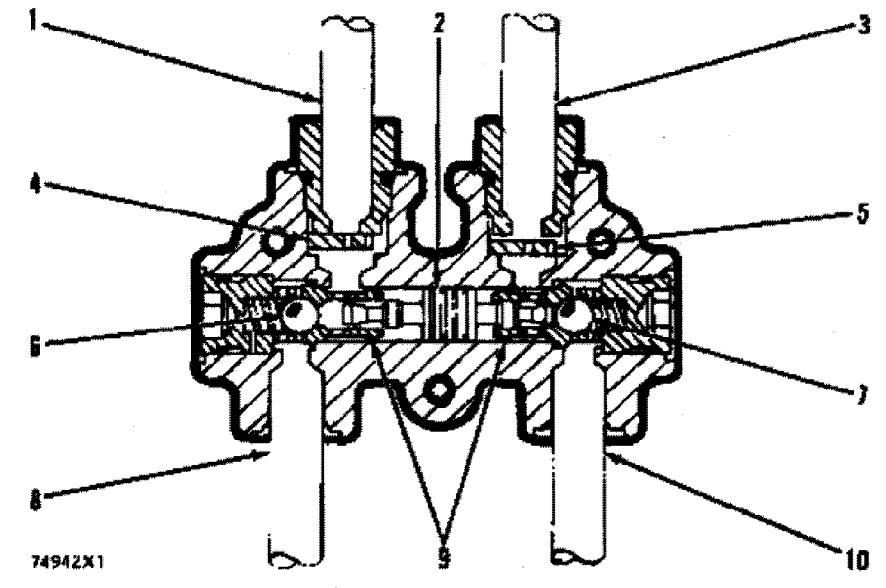


Figure 8-2. Location of lock check valves.

While it is imperative to prevent the boom and stick from falling during hydraulic rupture, it is equally as imperative to prevent the bucket from inadvertently falling because of the combined weight of the bucket and coupler. To prevent the weight of the combined jaw bucket/coupler from pushing the return hydraulic fluid (from the bucket hydraulic cylinder) back to the tank faster than the pump can supply fluid to the bucket hydraulic cylinder, a lock check valve shall be installed onto the extendible stick as shown in contract drawing 519931 and Figure 8-2. Installing an orifice within the check valve prevents the hydraulic fluid from flowing quickly back to the tank.

Figure 8-3 presents a cross sectional view of the desired check valve. During loss of oil pressure, the oil in lines 8 and 10 is stopped, and the rod in the cylinder cannot move. The springs in lines 6 and 7 and the oil in lines 8 and 10 keep the balls on the seats in line 9. The oil in lines 1 and 3 are either at tank pressure (emergency stop) or atmospheric pressure (line rupture).

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental Restoration		Revision: 1
		Page: 8-4 of 8-20



**LOCK CHECK VALVE (With outlet chokes)**

1. Line to implement valve. 2. Piston. 3. Line to implement valve. 4. Choke in outlet. 5. Choke in outlet. 6. Ball. 7. Ball. 8. Line to rod end of cylinder. 9. Seats. 10. Line to head end of cylinder.

Figure 8-3. Lock check valve.

Loss of hydraulic pressure occurs when the engine is turned off, the supply hydraulic line ruptures between the valve body and the check valve, and/or the return hydraulic line ruptures between the check valve and the valve body.

### 8.1.2 Work Included

This specification covers the Subcontractor and equipment supplier's requirements for the purchase, fabrication, assembly, installation, and testing of the lock check valves. It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and the equipment supplier and Subcontractor's standard practices when such practices do not conflict with this specification.

The lock check valve systems and all associated hardware shall be completely assembled and installed into the 446B backhoe at the Subcontractor's facility.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 8-5 of 8-20

The following shall be delivered to Bechtel BWXT Idaho, LLC:

- A complete and fully integrated system of the lock check valve and associated hardware on a 446B backhoe boom cylinder as shown on contract drawing 519931
- A complete and fully integrated system of the lock check valve and associated hardware on a 446B backhoe stick cylinder as shown on contract drawing 519931
- A complete and fully integrated system of the lock check valve and associated hardware on a 446B backhoe bucket cylinder as shown on contract drawing 519931
- Vendor data submittals in accordance with the vendor data schedule and this specification.

#### **8.1.3 Work Not Included**

None identified.

#### **8.1.4 INEEL—Furnished Materials, Equipment, and Services**

The Idaho National Engineering and Environmental Laboratory (INEEL) will furnish the 446B backhoe loader.

### **8.2 Applicable Codes, Procedures, and References**

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

#### **8.2.1 National and Local Codes**

Occupational Safety and Health Administration (OSHA):

- OSHA 29 CFR 1910, “Occupational Safety and Health Standards.”

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-6</b> of 8-20

### **8.2.2 Industry Procedures and DOE Orders**

American Institute of Steel Construction (AISC):

- AISC, “Manual of Steel Construction.”
- American Society of Testing and Materials (ASTM):
- ASTM A36, “Structural Steel”
- ASTM A570, “Standard Specification for Structural Steel, Sheet and Strip, Carbon, Hot-Rolled”
- ASTM A325, “Standard Specification for Structural Bolts, Steel, Heat-Treated 120/105 ksi Minimum Tensile Strength.”

Society of Automotive Engineers (SAE):

- SAE J31, “Hydraulic Backhoe Lift Capacity”
- SAE J109, “Hydraulic Excavator Lift Capacity Calculation and Test Procedure.”

American National Standards Institute (ANSI)/American Welding Society (AWS):

- ANSI/AWS A2.4, “Standard Symbols for Welding, Brazing, and Non-Destructive Examination”
- ANSI/AWS D9.1, “Welding Requirements for Sheet Metal.”

### **8.2.3 Military (National) Specification**

Not applicable.

### **8.2.4 Related Specifications**

Not applicable.

### **8.2.5 References**

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	8-7 of 8-20

### **8.3 Technical Requirements**

#### **8.3.1 General**

The lock check valve device shall be designed by the equipment supplier to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the design requirements for the lock check valve device.

Hydraulic pressure: 2,900–3,500 lb

Hydraulic Flow: up to 35 gpm

#### **8.3.2 Restrictions**

None identified.

#### **8.3.3 Performance Requirements**

The locking check valve shall be capable of stopping the boom, stick, and bucket descent during loss of hydraulic pressure in the supply line, return line, or all three lines simultaneously.

The locking check valve shall be capable of stopping the boom, stick, and bucket descent during backhoe engine shutdown or failure.

The locking check valve shall be capable of preventing the jaw bucket from inadvertently curling during a controlled manipulation of the bucket because of the weight of the bucket (see Backhoe Flow Restrictions Specification within this specification package).

#### **8.3.4 Software**

Not applicable.

#### **8.3.5 Registered Professional Engineer Certification**

Not applicable.

#### **8.3.6 Human Factors**

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-8</b> of 8-20

### **8.3.7 Reliability and Maintainability**

#### **8.3.7.1 Reliability**

All subcomponents of the lock check valve device shall be of a quality that the expected mean time between failure for this system shall not be less than 1,080 hours.

The lock check valve bearings, fittings, and controls shall be sealed against moisture and damaging particle intrusion using standard industrial components, as practical.

The lock check valve systems shall employ rugged, industrial off-the-shelf equipment to the maximum extent practical.

#### **8.3.7.2 Maintainability**

The lock check valve device standard replacement parts, shown on manufacturer's recommendations, shall be readily available for routine maintenance activities.

### **8.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements**

Not applicable.

### **8.3.9 Natural Phenomena Requirements**

Not applicable.

## **8.4 Environmental, Safety, and Health Requirements**

### **8.4.1 Subcontractor Safety**

The Subcontractor shall work in accordance with applicable OSHA requirements as stated in 29 CFR 1910.

### **8.4.2 Personal Protective Equipment**

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-9</b> of 8-20

#### **8.4.3 Emergency Response**

Not applicable.

#### **8.4.4 Accident Investigation**

Not applicable.

### **8.5 Manufacturing and Assembly**

#### **8.5.1 General**

The lock check valves shall be installed onto a 446B backhoe, in the Subcontractor's shop, to ensure proper fitting and operation. The Contractor's technical representative or alternate will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor's facility.

#### **8.5.2 Prohibitions**

None identified.

#### **8.5.3 Material**

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in the equipment manufacturer's standard commercial practice. Materials shall be as delineated on contract drawings.

#### **8.5.4 Fabrication**

##### **8.5.4.1 Welding**

Welding shall be performed in accordance with the subcontract. All welding shall be performed in accordance with AWS D 9.1. Welders and weld procedures shall be qualified in accordance with AWS D 9.1. Weld procedures, welder qualifications, nondestructive testing procedures, and nondestructive testing personnel qualifications shall be submitted to the Contractor for approval before performing any welding. Wherever stress relieving is required to maintain dimensional requirements, it shall be done before

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-10</b> of 8-20

machining. Finished weld surfaces shall be free of defects. Welds being ground must be kept cool at all times to minimize distortion and discoloration. The original material thickness shall be maintained after all grinding and polishing processes.

#### **8.5.5 Equipment Tagging**

Not applicable.

#### **8.5.6 Cleaning, Painting, and Coating**

All mounting equipment shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed. All burrs, castings, scars, and sharp edges shall be ground smooth.

#### **8.5.7 Spare Parts**

Cross reference the applicable standard quality requirements identified in the procurement package.

#### **8.5.8 Other Processes**

Not applicable.

### **8.6 Submittals**

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

#### **8.6.1 General Submittal Requirements**

##### **8.6.1.1 General Procedures**

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier, or supplier, shall be submitted as instruments of the Subcontractor. Therefore, prior to submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-11</b> of 8-20

submittal itself meet all the requirements of the subcontract specifications, drawings, and other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment and literature with respect to the information provided in the specification and on the vendor data schedule. Each submittal shall be numbered consecutively.

#### 8.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, drawing, or specification reference and a description of the item or service. The type of submittal is identified by a "Vendor Data" code, and the time required to submit the item is identified by a "When to Submit" code. An "Approval" code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required; additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

#### 8.6.1.3 Vendor Data Transmittal and Disposition Form 431.13

All vendor data shall be submitted to the Contractor using the Vendor Data Transmittal and Disposition Form. The form provides the Subcontractor a method to submit vendor data and provides the Contractor a means of dispositioning the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), the drawing or specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-12</b> of 8-20

#### 8.6.1.4 Disposition by the Contractor

The Contractor's comments and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. Work May Proceed: Submittals so noted will generally be classed as data that appears to be satisfactory without corrections.
- B. Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal: This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. Work May NOT Proceed. Revise and Resubmit: Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
  - (1) Submittal requires corrections, shown on comments, prior to a final review
  - (2) Submittal data is incomplete and requires more detailed information before a final review
  - (3) Submittal data does not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Mandatory approval-coded vendor data will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. The A, B, and C-coded dispositioned submittals will be returned to the Subcontractor. The D-dispositioned submittals will not be returned to the Subcontractor. The Contractor may provide internal review

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-13</b> of 8-20

of information only submittals. In the event that comments are generated on an information only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

#### **8.6.2 Spare Parts and Special Tools List**

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the lock check valve system. This list shall include all corresponding suppliers of each component and their phone numbers.

#### **8.6.3 Operating and Maintenance Manuals**

The operations and maintenance manual shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for the installation shall be included and incorporated in the manual.

#### **8.6.4 Drawings**

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the lock check valve devices. These drawings shall document the mechanical and hydraulic configuration.

#### **8.6.5 Software**

Not applicable.

#### **8.6.6 Weld Requirements**

##### **8.6.6.1 Weld Procedures**

Welding procedures shall be in accordance with AWS D 9.1. A copy of the weld procedures to be used in this work shall be submitted to INEEL for approval prior to fabrication.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-14</b> of 8-20

#### 8.6.6.2 Welder Qualifications

All welder qualifications and qualification procedures shall be in accordance with AWS D 9.1. Copies of welder qualifications shall be submitted to INEEL for approval prior to fabrication.

#### 8.6.6.3 Nondestructive Examination Procedures and Qualifications

Liquid penetrant testing, radiographs, and inspections shall be performed in accordance with Section 8.7.3 of this specification. All nondestructive examination procedures and inspector qualifications shall be submitted to the INEEL for approval prior to fabrication.

### 8.6.7 Inspection Test Plans, Procedures, and Reports

Inspection of these documents includes the following:

- **Performance test procedures (Subcontractor preshipment):**  
Performance test plans and procedures as outlined in section 8.7.4.1 of this specification.
- **Performance test reports (Subcontractor preshipment):**  
Performance test results and reports as outlined in section 8.7.4.2 of this specification.

## 8.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

### 8.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled and installed by a firm that has prior related experience pertaining to the installation of a lock check valve on a hydraulic system.

### 8.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meets the codes and standards identified in this specification.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-15</b> of 8-20

### **8.7.3 Nondestructive Examination**

#### **8.7.3.1 Weld Inspections and Examinations**

Visual examination shall be performed for workmanship and all materials and components of the structure, as specified in this specification.

Visual examination of welding shall be performed in accordance with AWS D 9.1. Visual acceptance criteria shall be in accordance with AWS D9.1, section 6. Exception is no visible pores.

### **8.7.4 Operational Testing**

#### **8.7.4.1 Performance Test Procedures (Subcontractor Preshipment)**

The equipment supplier or Subcontractor shall submit to the Contractor an “in-shop” testing plan and procedure before the demonstration of the locking check-valve capabilities. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The Subcontractor shall inform the Contractor one week in advance of performance testing so a Contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all equipment operates and interfaces together into a functional automated check valve system as defined within this specification.

Testing acceptance includes the following criteria:

- Test the lock check valve’s capability at stopping the boom descent during a loss of supply fluid through manipulation of the appropriate valve, followed by engine shut down
- Test the lock check valve’s capability at stopping the stick descent during a loss of supply fluid through manipulation of the appropriate valve, followed by engine shut down

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-16</b> of 8-20

- Test the lock check valve's capability at stopping both the stick and the boom descent during backhoe engine failure through engine shut down, followed by valve manipulation
- Test the lock check valve's capability at preventing inadvertent bucket movement (because of the weight of the bucket) during a controlled bucket manipulation (curl and uncurl).

#### 8.7.4.2 Performance Test Reports (Subcontractor Preshipment)

The Subcontractor shall submit to the Contractor the "in-shop" testing results following demonstration of the locking check valves at the equipment supplier's or Subcontractor's facility.

#### 8.7.5 Special Processes

Not applicable.

### 8.8 Packaging and Shipping

#### 8.8.1 Packing and Packaging

Not applicable.

#### 8.8.2 Marking and Handling

Not applicable.

#### 8.8.3 Special Transportation Requirements

Not applicable.

### 8.9 Installation and Maintenance

#### 8.9.1 Installation

The lock check devices shall be installed onto the 446B backhoe, used for the OU 7-10 Glovebox Excavator Method Project, at the Subcontractor's facility.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-17</b> of 8-20

#### **8.9.2 Startup and Calibration**

Not applicable.

#### **8.9.3 Training**

Not applicable.

#### **8.9.4 Maintenance**

Not applicable.

### **8.10 Marking and Identification**

Not applicable.

### **8.11 Acceptance**

#### **8.11.1 Final Acceptance Method**

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

#### **8.11.2 Inspection and Hold Points**

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least five working days in advance of the time that the lock check valves shall be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

#### **8.11.3 INEEL Surveillance and Audits**

The authorized Contractor representative may perform source inspection or surveillance.

### **8.12 Attachments**

Vendor data schedule, Form 431.14.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>8-18</b> of 8-20

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Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 8-19 of 8-20

431.14  
08/01/2001  
Rev. 03

## Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - LOCK CHECK VALVES Project No. 021052 - 22005

System Engineer/ Project Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

Specification  Environmental Restoration	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401 Revision: 1 Page: <b>8-20</b> of 8-20
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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
2	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only
3	6.3		L. O&M Manual	4	PS - Prior to Shipment	Information Only
4	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	Approval Required
5	6.6.1		AR. Weld Procedure Qualificaion	4	BFR - Before Fabrication Release	1. Approval Required
6	6.6.2		AS. Welder Performance Personnel Qualifications	4	BFR - Before Fabrication Release	1. Approval Required
7	6.6.3	Non-Destructive Examination Procedures	AZ. Other	4	BFR - Before Fabrication Release	1. Approval Required
8	6.6.3		AT. Non-Destructive Examination Personnel Certifications	4	BFR - Before Fabrication Release	1. Approval Required
9	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
10	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.  
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.  
3. The normal number of copies required is ONE. If more are required, the number will be shown here.  
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental Restoration		Revision: 1
		Page: 9-1 of 9-24

## 9. EQUIPMENT AND ADDITIONAL MODIFICATIONS

### 9.1 Summary

#### 9.1.1 General

Operable Unit (OU) 7-10, which comprises Pit 9, is a 1-acre pit within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL), averaging 17.5 ft deep that was filled in the late 1960s with 3.5 ft of underburden, 7.5 ft of waste with interstitial layers of soil, and a top layer of 3.5 ft of soil overburden.

Excavating the pit consists of removing the 3.5 ft of overburden, placing the soil in 4 × 4-ft sacks, and removing the sacks from the Retrieval Confinement Structure (RCS) before excavating the waste zone. Following the overburden removal, waste materials around the existing ground probes are removed and placed on transfer carts for processing within the Packaging Glovebox System units shown in Figure 9-1.

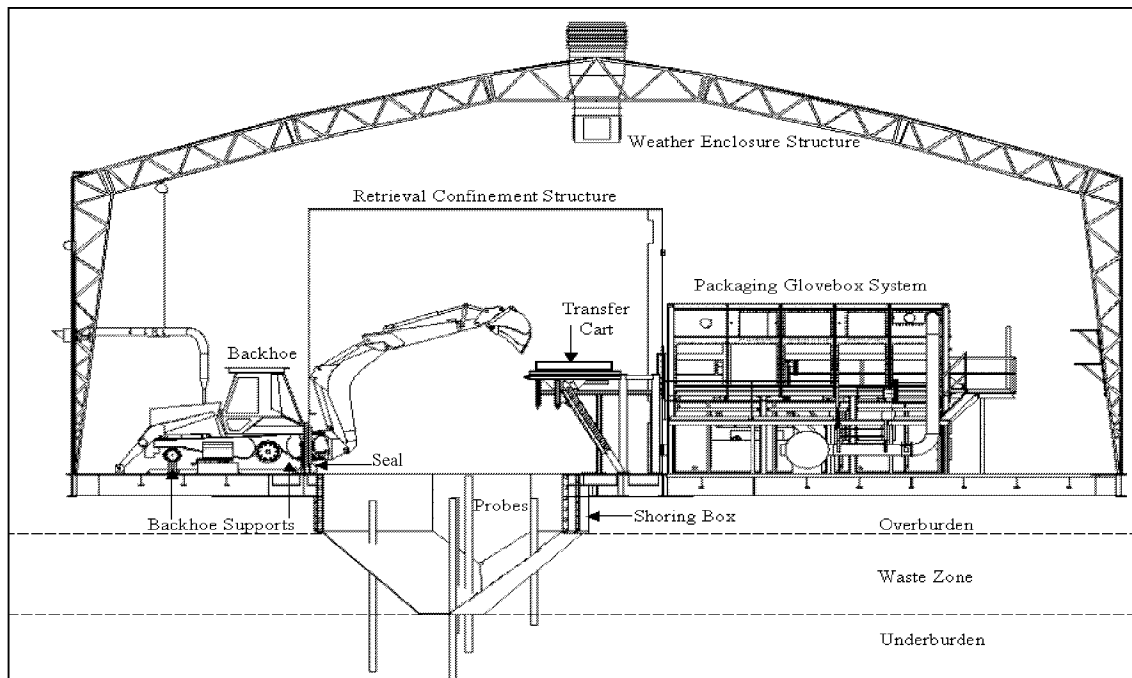


Figure 9-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-2 of 9-24

### 9.1.2 Work Included

It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and the standard practices of the equipment supplier and Subcontractor when such practices do not conflict with this specification. The CAT 446B backhoe and equipment shall have the following modifications supplied under this contract:

- A. Supply items in the equipment list in Section 9.1.5 (by the Subcontractor).
- B. Protect all hydraulic hoses leading from the end of the backhoe stick that is opposite the backhoe cab to the end effectors, and all end effector hoses, with coiled hydraulic hose guards. Typical hose guards are shown in Figure 9-2.
- C. Install a Wain-Roy remote hydraulic coupler (Wain-Roy item Part Number 40311). Install this coupler at the end of the backhoe bucket linkage as shown in Figure 9-2. Install PIN valve as shown on Contract Drawing 519931.
- D. Install two hydraulic hoses to circulate hydraulic fluid to and from the end effectors (the Caterpillar Inc. [CAT] H45s hydraulic hammer and the 24-in. Wain-Roy Jaw bucket). The CAT H45s hammer and Jaw bucket shall share a single set of hydraulic hoses. These shall be 5/8-in., trifluoroethylene (TFE), hydraulic hose, with 4,000-psi working pressure (Parker Item 950B). The hydraulic hoses shall terminate in one male and one female manual quick-disconnect fitting. These fittings shall be anchored to the Wain-Roy remote hydraulic coupler by a plate welded to the coupler, as shown in Figure 9-3. These quick disconnects shall be located on the left side of the coupler as viewed by the operator when operating the backhoe, as shown in Figure 9-3. These quick disconnects shall be positioned to facilitate one-man connection and disconnection through the glove ports (see Figure 9-4).
- E. Install a toggle switch (located on the operating console of the backhoe), valve, and appropriate hydraulic piping and hoses to facilitate hydraulic activation of the Wain-Roy remote hydraulic coupler. The hose shall be a Parker, TFE, with 4,000-psi working pressure, of appropriate diameter to operate the remote hydraulic coupler.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 9-3 of 9-24

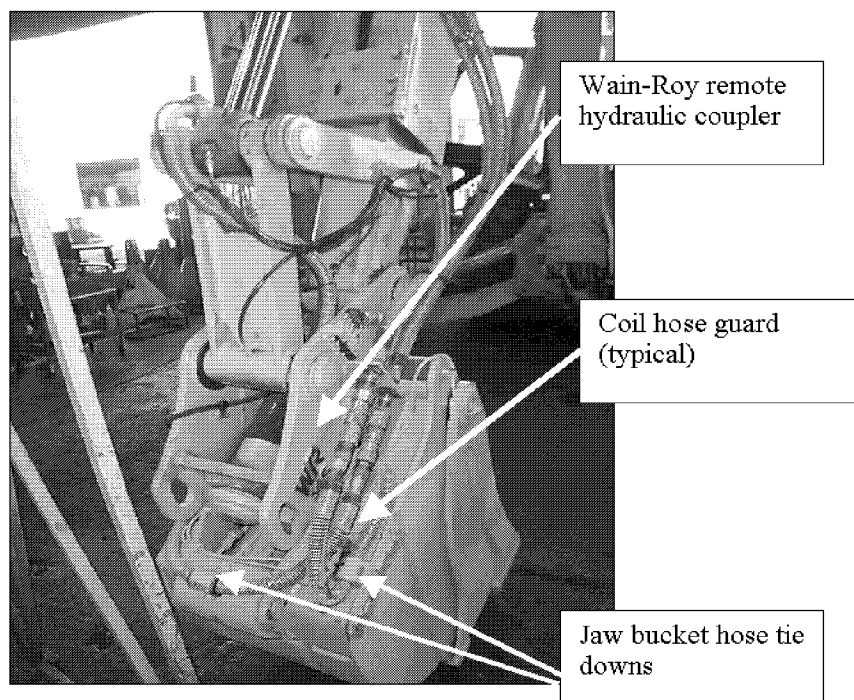


Figure 9-2. End view of the 24-in. Jaw bucket.

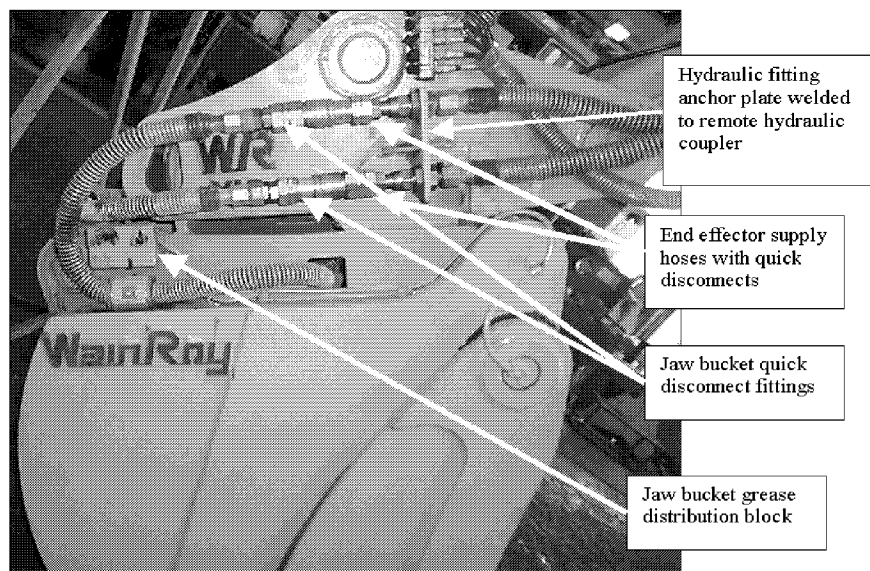


Figure 9-3. Side view of the 24-in. Jaw bucket.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-4 of 9-24

F. Modify CAT H45s hydraulic hammer and attachments.

The CAT H45s hammer shall be fitted with a bolt-on Wain-Roy remote hydraulic coupler adapter (Wain-Roy part number 1005824). This item shall be bolted to the top of the CAT H45s hammer, as shown in Figure 9-5. The hydraulic hoses of the hammer shall be serpentine and supported with clamps, as shown in Figure 9-5. The hammer hydraulic hose ends shall be fitted with one male manual quick disconnect (Holmbury part number QPQ5V34-SAE-3/4-M-H) and one female manual quick disconnect (Holmbury part number QPQ5V34-SAE-3/4-F-H) fittings. These quick disconnects shall be positioned and anchored, as shown in Figure 9-5. Quick disconnects blind ends are also shown in Figure 9-5. These blind ends are anchored to the remote hydraulic coupler adapter using a welded plate shown in Figure 9-8. These blind ends are used to secure the ends of the hammer hoses when the hammer is not in use. Caps shall be supplied for the blind ends when they are not securing the hose quick disconnects.

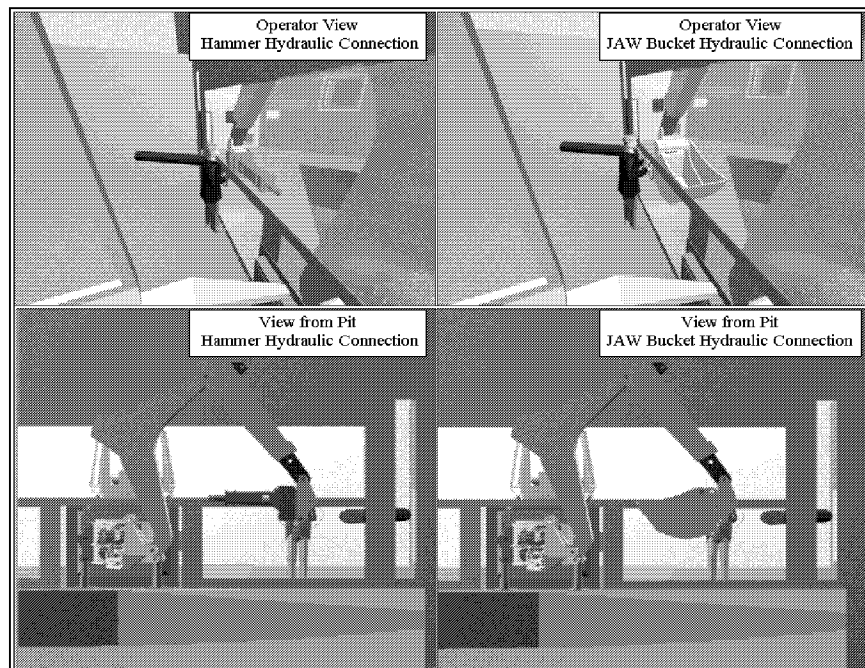


Figure 9-4. Relative locations and orientations for manual attachment of hydraulic hoses on the hydraulic hammer and Jaw bucket.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental Restoration		Revision: 1
		Page: 9-5 of 9-24

- (1) All manual quick-disconnect fittings, hammer grease points, hammer housing bolts, and hammer anvil removal pin access, shall be on the left side of the hammer as viewed by the operator when operating the backhoe. The proper orientation of all hammer equipment is shown in Figure 9-5.

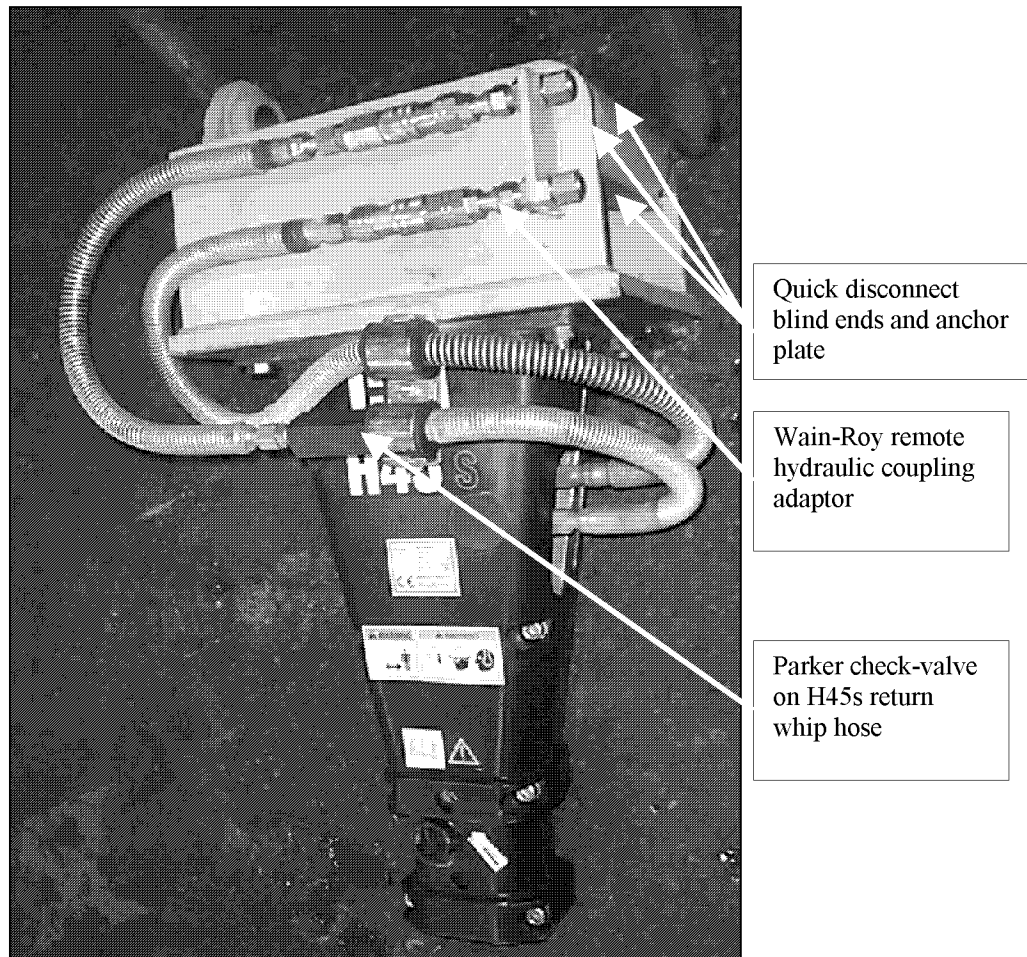


Figure 9-5. Hydraulic hammer assembly of the CAT H45s.

- (2) A special CAT H45s hammer anvil and associated parts, shown on drawing 522047, are required. A modified CAT spade tool, 522047-3, for the CAT H45s hydraulic hammer shall be provided. This tool shall be of the same material and heat treatment as the standard CAT spade tool. The dimensions of the spade blade shall be those of

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-6 of 9-24

the standard spade tool. A modified CAT H45s hydraulic hammer anvil (522047-4) shall be supplied. This anvil shall be of the same material as existing caterpillar anvils. It shall not be heat-treated until special female drill-string threads and other internal features, indicated on the drawing by dashed lines, are machined in its lower end. The anvil, with the internal threads and machining, shall be heat-treated by CAT to the standard anvil specifications. An adaptor, 522047-5, shall be supplied. Special male drill-string threads, which mate with the special female drill-string thread required above, shall be machined as shown on the drawing. The adaptor shall be heat-treated after the machining is complete. A heat-treated lock nut, 522047-6, shall also be supplied.

- (3) A Parker check-valve (part number 800S) shall be placed within the CAT H45s hydraulic hammer whip hose return line, as shown in Figure 9-5.
- G. Tie down the Wain-Roy Jaw bucket hoses to the bucket so that the hoses are accessible from the left side of the bucket when viewed by the operator while operating the backhoe. See Figure 9-2 for locations of the tie downs.
- H. Terminate the Wain-Roy Jaw bucket hydraulic hoses with one male Holmbury (part number QPQ5V34-SAE-3/4-M-H) and one female Holmbury (part number QPQ5V34-SAE-3/4-F-H) quick-disconnect fitting, as shown in Figure 9-3.
- I. Install a grease distribution block for lubricating the bucket linkage system. The distribution block shall have five separate zirc fittings and be located adjacent to the manual hose quick disconnects on the Wain-Roy remote hydraulic couple, as shown in Figure 9-6. The five grease fittings on the linkage shall be served by this block. Grease distribution lines shall run from this block to the five grease fittings on the linkage.
- J. Install a grease distribution block on the Jaw bucket. A grease distribution block with zirc fittings shall be installed on the left side of the Wain-Roy Jaw bucket as viewed by the operator when operating the backhoe. The three grease points on the Jaw bucket (hinge points and hydraulic cylinder pivot) shall be

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-7 of 9-24

lubricated by distribution lines from this block. The block location is shown in Figure 9-3.

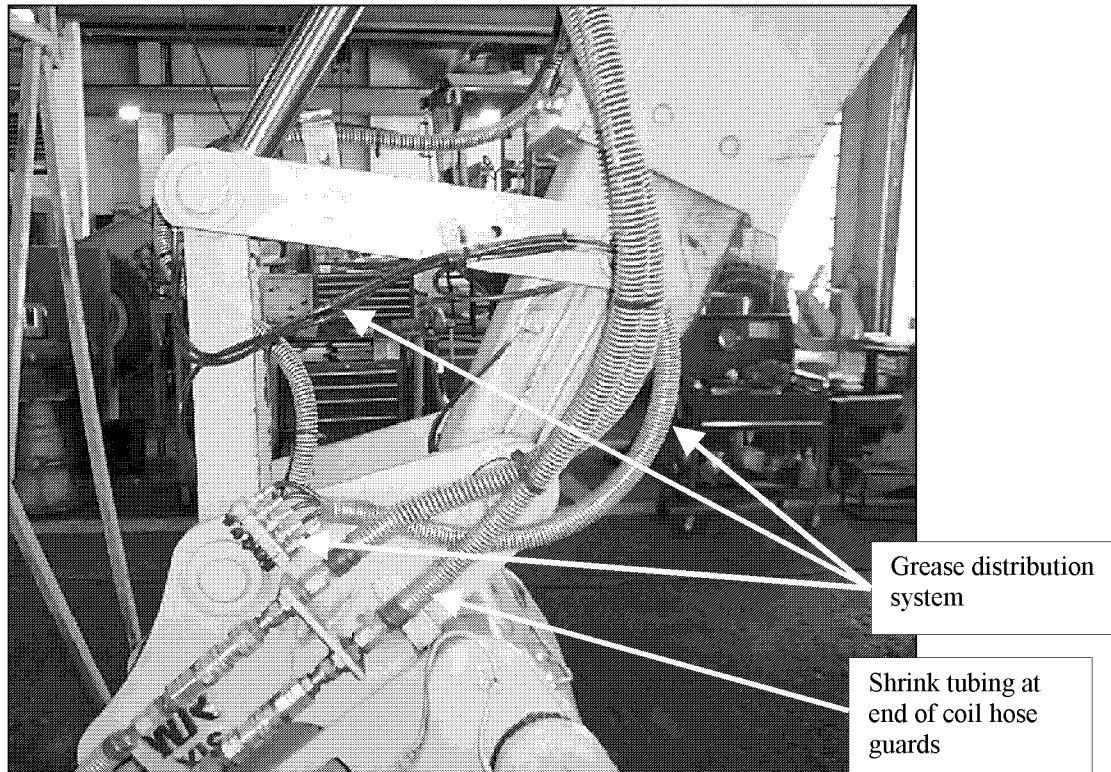


Figure 9-6. Grease distribution system for bucket linkage.

- K. Install a bucket position system. An Ocala Instruments and Research Inc., (part number OC 107-SET) bucket-depth and radial-position indicator system shall be installed on the backhoe. Installation shall be in accordance with the manufacturer's instructions. A switch on the readout indicator in the backhoe cab shall allow the operator to select between the bucket-depth reading and the bucket-radial position reading.
- L. Paint opening marks on the 24-in. Jaw bucket, 24-in. bucket (overburden bucket), 16-in. bucket, and CAT H45s hammer coupling grab-bar ends so that backhoe operator can see them clearly during operation. See Figure 9-7 for locations.
- M. Weld a soil retention plate in the Jaw bucket jaw to reduce the capacity of the bucket. The plate is to be installed in the front half of the jaw and follow the approximate mate line shown in Figure 9-8.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-8 of 9-24

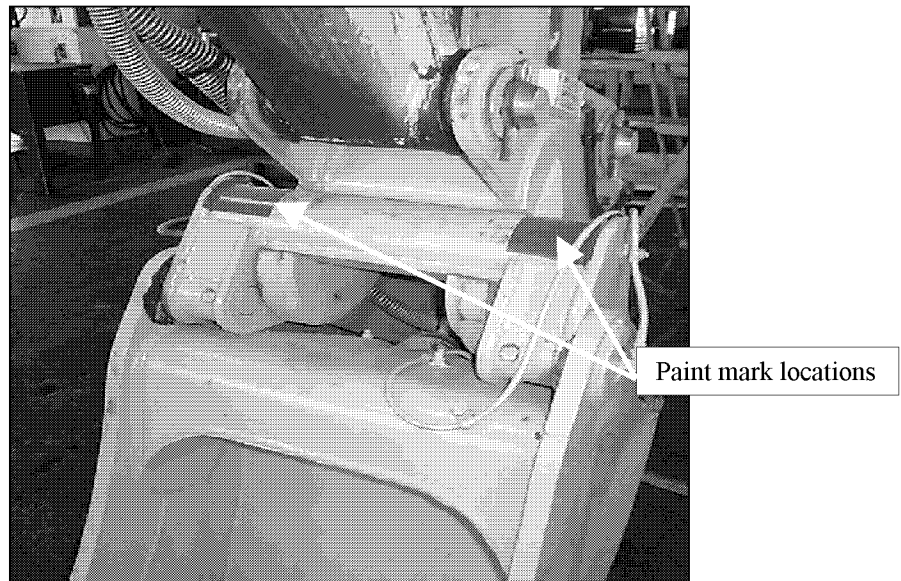


Figure 9-7. Paint marks for operator visibility during remote end effector attachment.



Figure 9-8. Jaw bucket with jaw open.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-9 of 9-24

- N. Apply weld deposition hard facing (Lincoln Wear Shield or similar) on the Jaw bucket clamping edges and on the jaw digging edge (opposite the clamping edge). Provide full-length hard facing on outside thumb edge of the Jaw bucket. Provide additional stitch weld hard facing (1 in. long by 1/8 in. high on 2-in. centers) on bucket clamping faces to assist in clamping the ends of 55-gal drums (see Figure 9-8).
- O. Smooth rough edges of the coiled hose guards termination points for the hydraulic lines near the quick-disconnect fittings to protect RCS gloveport gloves from damage (see Figure 9-9).

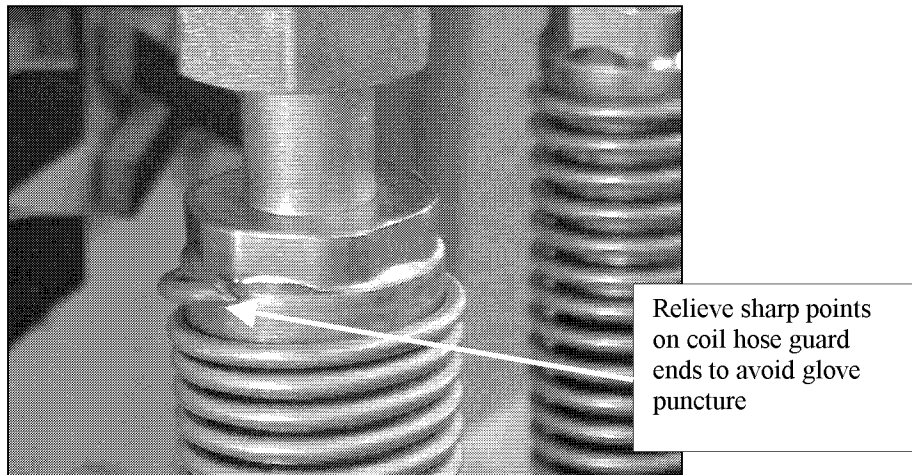


Figure 9-9. Termination of coiled hose guards.

- P. Cover all coiled hose guard termination points with shrink tubing to prevent glove penetration during hydraulic connection/disconnection and to prevent unwrapping the coils (see Figure 9-6).
- Q. Plug the boom water drain in accordance with Contract Drawing 519931.
- R. Disconnect and cap the tilt cylinder supply and return lines to the loader valve group. Remove the tilt cylinder lines from the lift group to the loader tilt cylinders. Remove the tilt cylinder and loader bucket linkage in accordance with Contract Drawing 519931.
- S. Remove the right and left loader cylinders and cap the lines in accordance with Contract Drawing 519931. Install the front adjustment assembly (supplied by the NQA-1 certified

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-10 of 9-24

Subcontractor) so the loader arm is 24 in. above grade in accordance with Contract Drawing 519931.

### 9.1.3 Work Not Included

None identified.

### 9.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader and front adjustment assemblies (from Nuclear Quality Assurance-1 [NQA-1] subcontract).

### 9.1.5 Physical Equipment List

The Subcontractor shall purchase, fabricate, install, and supply the following items.

- A. CAT H45s Hydraulic Hammer, part number 1613497.
- B. Wain-Roy remote hydraulic coupler, part number 40311.
- C. Wain-Roy heavy-duty class II, 16-in. bucket, part number 4623116.
- D. Wain-Roy heavy-duty class II, 24-in. bucket, part number 4623024.
- E. Wain-Roy 1/2-yd, 24-in., Jaw bucket, part number 0030291.
- F. Wain-Roy bolt-on adapter for CAT H45s hydraulic hammer; part number 1005824.
- G. Holmbury male manual quick disconnect, part number QPQSV34-SAE-3/4-M-H (CAT part number 1532995); quantity: 3.
- H. Holmbury female manual quick disconnect, part number QPQSV34-SAE-3/4-F-H (CAT part number 1932994); quantity: 3.
- I. Male blind end manual quick disconnect with cap, make from Holmbury part number QPQSV34-SAE-3/4-M-H (CAT part number 1532995).

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-11 of 9-24

- J. Female blind end manual quick disconnects with cap, make from Holmbury part number QPQSV34-SAE-3/4-F-H (CAT part number 1932994).
- K. Coiled hydraulic hose guards, as required.
- L. Toggle switch, valve, and appropriate hydraulic piping/hose to facilitate hydraulic activation of the Wain-Roy remote hydraulic coupler. This hose shall be a Parker, TFE, 4,000-psi working pressure, of the appropriate diameter.
- M. Modified CAT spade tool, INEEL Drawing 522047.
- N. Modified CAT H45s hydraulic hammer anvil for the spade tool, INEEL Drawing 522047.
- O. A heat-treated adaptor for the spade tool, INEEL Drawing 522047.
- P. A heat-treated lock nut, for the spade tool, INEEL Drawing 522047.
- Q. Hydraulic hose tie-downs on the Jaw bucket (quantity 2) and on the CAT H45s hydraulic hammer (quantity 2).
- R. Grease distribution system for lubricating the bucket linkage system.
- S. Grease distribution system for lubricating the Jaw bucket.
- T. Ocala Instruments and Research Inc. bucket-depth and radial-position indicator system, Ocala Part # OC 107-SET.
- U. Soil retention plate welded into the Jaw bucket jaw to reduce the capacity of the bucket.
- V. Weld deposition hard facing (Lincoln Wear Shield or equivalent) to the three Jaw bucket edges, as required.
- W. Shrink tubing for covering coiled hose guards at individual termination points, as required.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-12 of 9-24

## 9.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

### 9.2.1 National and Local Codes

Occupational Safety and Health Administration

- 29 CFR 1910, "Occupational Safety and Health Standards."

### 9.2.2 Industry Procedures and DOE Orders

American Society of Nondestructive Testing (ASNT)

- ASNT SNT-TC-1A, "Qualification and Certification of Nondestructive Personnel"

American National Standards Institute (ANSI)/American Welding Society (AWS)

- ANSI/AWS A2.4, "Standard Symbols for Welding, Brazing, and Non-Destructive Examination"
- ANSI/AWS D9.1, "Welding Requirements for Sheet Metal."

### 9.2.3 Military (National) Specification

Not applicable.

### 9.2.4 Related Specifications

Not applicable.

### 9.2.5 References (such as past designs, drawings, and reports)

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>9-13</b> of 9-24

### **9.3 Technical Requirements**

#### **9.3.1 General**

Not applicable.

#### **9.3.2 Restrictions**

Not applicable.

#### **9.3.3 Performance Requirements**

Not applicable.

#### **9.3.4 Software**

Not applicable.

#### **9.3.5 Registered Professional Engineer Certification**

Not applicable.

#### **9.3.6 Human Factors**

The installations shall use human factor engineering principles and criteria such that all equipment is easily maintainable. The installations shall provide access to each system component (located outside of the RCS) for operation, cleaning, and maintenance.

#### **9.3.7 Reliability and Maintainability**

##### **9.3.7.1 Reliability**

All subcomponents of the equipment listed in Section 9.1 shall be of a quality that the expected mean time between failures for these items shall not be less than 1,080 hours.

The Subcontractor shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

Any plastics or elastomers inside the RCS shall be compatible with a high concentration of volatile carbon tetrachloride.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	<b>9-14</b> of 9-24

#### 9.3.7.2 Maintainability

The equipment listed in Section 9.1 shall be installed or assembled to facilitate ease of inspecting, servicing, and maintaining equipment.

Standard replacement parts, shown on the recommendations from the manufacturer, shall be readily available for routine maintenance activities.

#### **9.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements**

Not applicable.

#### **9.3.9 Natural Phenomena Requirements (such as seismic, wind, and flood)**

Not applicable.

### **9.4 Environmental, Safety, and Health Requirements**

#### **9.4.1 Subcontractor Safety**

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements, as stated in 29 CFR 1910.

#### **9.4.2 Personal Protective Equipment**

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

#### **9.4.3 Emergency Response**

Not applicable.

#### **9.4.4 Accident Investigation**

Not applicable.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-15 of 9-24

## **9.5 Manufacturing and Assembly**

### **9.5.1 General**

The equipment listed in Section 9.1 shall be assembled and installed onto a CAT 446B backhoe, in the Subcontractor's shop, to ensure proper fit and operation. The technical representative (or alternate) of the Contractor (Bechtel BWXT Idaho, LLC) will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor's facility.

### **9.5.2 Prohibitions**

None identified.

### **9.5.3 Material**

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials used within the RCS shall be compatible with volatile carbon tetrachloride. Materials not specified herein shall be of the same quality used for the intended purpose in the standard commercial practice of the equipment manufacturer.

### **9.5.4 Fabrication**

#### **9.5.4.1 Welding**

Welding shall be performed in accordance with the subcontract. All welding shall be performed in accordance with AWS D 9.1. Welders and weld procedures shall be qualified in accordance with AWS D 9.1. Weld procedures, welder qualifications, nondestructive testing procedures, and nondestructive testing personnel qualifications shall be submitted to the Contractor for approval before performing any welding. Wherever stress relieving is required to maintain dimensional requirements, it shall be done before machining. Finished weld surfaces shall be free of defects. Welds being ground must be kept cool at all times to minimize distortion and discoloration. The original material thickness shall be maintained after all grinding and polishing processes.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-16 of 9-24

#### **9.5.5 Equipment Tagging**

Not applicable.

#### **9.5.6 Cleaning, Painting, and Coating**

All equipment shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed. All burrs, castings scars, and sharp edges shall be ground smooth.

#### **9.5.7 Spare Parts**

Applicable standard quality requirements identified in the procurement package will be cross referenced.

#### **9.5.8 Other Processes**

Not applicable.

### **9.6 Submittals**

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

#### **9.6.1 General Submittal Requirements**

##### **9.6.1.1 General Procedures**

Vendor data, whether prepared by the Subcontractor or the Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal meet all the requirements of the subcontract specifications.

Each submittal shall contain identification for each separable and separate piece of material or equipment and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-17 of 9-24

shall be numbered consecutively for each different submittal.

#### 9.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required. The vendor data schedule may require additional copies. Electronic file submittals are preferred.

#### 9.6.1.3 Form 431.13, "Vendor Data Transmittal and Disposition"

All vendor data shall be submitted to the Contractor using Form 431.13, "Vendor Data Transmittal and Disposition Form." The form provides a method for the Subcontractor to submit vendor data and a means by which Contractor may disposition the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what is included in the submittal.

#### 9.6.1.4 Disposition by the Contractor

Comments by the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 9-18 of 9-24

- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
- (1) Submittal requires corrections, shown on comments, before final review.
  - (2) Submittal data are incomplete and require more detailed information before the final review.
  - (3) Submittal data do not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor. Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may provide internal review of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-19 of 9-24

prompt review is dependent on timely and complete  
submittals in strict accordance with these instructions.

#### **9.6.2 Spare Parts and Special Tools List**

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the equipment listed in Section 9.1. This list shall include all corresponding suppliers of each component and their phone numbers.

#### **9.6.3 Operating and Maintenance Manuals**

The Subcontractor shall submit operations and maintenance manuals to the Contractor for the equipment referred to within Section 9.1.5, Paragraphs A, B, E, and T. The operations and maintenance manuals shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for installation shall be included and incorporated in the manual.

#### **9.6.4 Drawings**

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of items referred to within Section 9.1.2 Paragraphs D, F(2), I, J, and K. These drawings shall document the mechanical, electrical, and instrumentation configuration.

#### **9.6.5 Software**

Not applicable.

#### **9.6.6 Weld Requirements**

##### **9.6.6.1 Weld Procedures**

Welding procedures shall be in accordance with AWS D 9.1. A copy of the weld procedures to be used in this work shall be submitted to INEEL for approval before fabrication.

##### **9.6.6.2 Welder Qualifications**

All welder qualifications and qualification procedures shall be in accordance with AWS D 9.1. Copies of welder

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-20 of 9-24

qualifications shall be submitted to INEEL for approval before fabrication.

#### 9.6.6.3 Nondestructive Examination Procedures and Qualifications

Liquid penetrant testing, radiographs, and inspections shall be performed in accordance with Section 9.7.3 of this specification. All nondestructive examination procedures and inspector qualifications shall be submitted to the INEEL for approval before fabrication.

### 9.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

#### 9.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled and installed by a firm that has prior related training and experience pertaining to the rerouting of backhoe hydraulic lines and installation of auxiliary equipment onto a CAT 446B backhoe.

#### 9.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

#### 9.7.3 Nondestructive Examination

##### 9.7.3.1 Weld Inspections and Examinations

Visual examination shall be performed for workmanship and all materials and components of the structure, as specified in this specification.

Visual examination of welding shall be performed in accordance with AWS D 9.1. Visual acceptance criteria shall be in accordance with AWS D9.1, Section 6. Exception is no visible pores.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-21 of 9-24

#### **9.7.4 Operational Testing**

Not applicable.

#### **9.7.5 Special Processes**

Not applicable.

### **9.8 Packaging And Shipping**

#### **9.8.1 Packing and Packaging**

Not applicable.

#### **9.8.2 Marking and Handling**

Not applicable.

#### **9.8.3 Special Transportation Requirements**

Not applicable.

### **9.9 Installation and Maintenance**

#### **9.9.1 Installation**

The modifications listed in Section 9.1 shall be performed on the CAT 446B backhoe, used for this project, at the Subcontractor's facility.

#### **9.9.2 Startup and Calibration**

Not applicable.

#### **9.9.3 Training**

**NOTE:** *It is anticipated that the backhoe equipment and modifications will be simple enough that formal training above the instructions provided with the various equipment will not be required.*

The Subcontractor shall provide any required training (above the instructions provided with the supplied equipment) to an INEEL representative who will then provide training to other INEEL personnel.

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier:	SPC-401
Environmental		Revision:	1
Restoration		Page:	9-22 of 9-24

#### **9.9.4 Maintenance**

The Subcontractor shall provide recommended maintenance instructions for the equipment listed in Section 9.1.

#### **9.10 Marking and Identification**

Not applicable.

#### **9.11 Acceptance**

##### **9.11.1 Final Acceptance Method**

Proper operation and functioning of all scope items shall be demonstrated with the Contractor representative present before the Contractor will accept the backhoe system.

##### **9.11.2 Inspection and Hold Point**

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the equipment and modifications (listed in Section 9.1) shall be available for source inspection by the Contractor representative.

##### **9.11.3 INEEL Surveillance and Audits**

An authorized Contractor representative may perform service inspection or surveillance.

#### **9.12 Attachments**

Form 431.14, "Vendor Data Schedule."

Specification	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401
Environmental		Revision: 1
Restoration		Page: 9-23 of 9-24

431.14  
08/01/2001  
Rev. 03

## Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - EQUIPMENT AND ADDITIONAL MODIFICATIONS Project No. - 32323

System Engineer/Project Manager DAVIES STEVEN A Date: 20-AUG-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
<b>A. As-Built Drawings</b> <b>B. Assembly Drawings</b> <b>C. Attendance Record</b> <b>D. Blasting Plan</b> <b>E. Catalog Data</b> <b>F. Chem &amp; Physical Analysis</b> <b>G. Concrete Mix Design</b> <b>H. Control System Diagram</b> <b>I. Design Calculations</b> <b>J. Installation Instructions</b>	<b>K. Manufacturers Data Report</b> <b>L. O&amp;M Manual</b> <b>M. Parts List</b> <b>N. Piping Drawing</b> <b>O. Procedure/Instructions</b> <b>P. Pump Head Curves</b> <b>Q. Personnel Qualifications</b> <b>R. Red_line Drawings</b> <b>S. RSMI &amp; Maintenance Log</b> <b>T. Sample(Color, Texture, etc.)</b>	<b>U. Shop Drawings</b> <b>V. Survey Records</b> <b>W. Test Procedure</b> <b>X. Special Processes</b> <b>Y. Operational/CC Testing</b> <b>Z. Test Reports</b> <b>AA. UL/FM Listing</b> <b>AB. Warranty/Guarantee</b> <b>AC. Weld Records</b> <b>AD. Wiring Diagrams</b>	<b>AE. MSDS</b> <b>AF. Hardware Schedule</b> <b>AG. Specification</b> <b>AH. Manufacturing/Inspection/Test Plan</b> <b>AI. Test Certification</b> <b>AJ. Recommended Spares</b> <b>AK. Special Tools List</b> <b>AL. Certificate of Conformance</b> <b>AM. Certificate of Disposal or Destruction</b> <b>AN. Design Verification</b>	<b>AO. Design Qualification Testing</b> <b>AP. Traceability Procedure</b> <b>AQ. Cleaning Procedure</b> <b>AR. Weld Procedure Qualification</b> <b>AS. Welder Performance Personnel Qualifications</b> <b>AT. Non-Destructive Examination Personnel Certifications</b> <b>AU. Inspector Certifications</b> <b>AV. Limited Shelf Life/Operational Data</b> <b>AW. Special Packaging, Shipping, and Rigging Procedure</b> <b>AX. Certificate of Materials to ASME Code</b> <b>AY. Chemical Inventory</b> <b>AZ. Other</b>
When to Submit				
<b>AC - As Completed</b> <b>AT - After Test</b> <b>BC - Before Contract Awarded</b>	<b>BFA - Before Final Acceptance</b> <b>BFR - Before Fabrication Release</b> <b>ROS - Removed Off-Site</b> <b>PDS - Prior to Delivery on site</b>	<b>PTP - Prior to Purchase</b> <b>PS - Prior to Shipment</b> <b>PT - Prior to Test</b>	<b>PTC - Prior to Construction Start</b> <b>PTI - Prior to Installation</b> <b>PTW - Prior to Welding</b>	<b>TS - Time of Shipment</b> <b>WP - With Proposal</b>

Specification  Environmental Restoration	<b>BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT</b>	Identifier: SPC-401 Revision: 1 Page: 9-24 of 9-24
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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	2. Information Only
2	6.2		AK. Special Tools List	4	PS - Prior to Shipment	2. Information Only
3	6.3		L. O&M Manual	4	PS - Prior to Shipment	2. Information Only
4	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	1. Approval Required
5	6.6.1		AR. Weld Procedure Qualificaion	4	BFR - Before Fabrication Release	1. Approval Required
6	6.6.2		AS. Welder Performance Personnel Qualifications	4	BFR - Before Fabrication Release	1. Approval Required
7	6.6.3	Non-Destructive Examination Procedures	AZ. Other	4	BFR - Before Fabrication Release	1. Approval Required
8	6.6.3		AT. Non-Destructive Examination Personnel Certifications	4	BFR - Before Fabrication Release	1. Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.  
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.  
3. The normal number of copies required is ONE. If more are required, the number will be shown here.  
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

- GOVERNMENT FURNISHED EQUIPMENT (GFE)**

CONTINUED

REVISIONS														
REV STATUS OF SHEETS		REV		DESCRIPTION		EFFECTIVE DATE								
1	2	2	2	2	2	2	2	2	2	2	2	1	SEE DAR 93628	7-19-2002
2	2	2	2	2	2	2	2	2	2	2	2	2	SEE DAR-93625	8/26/2002

QTY	SAFETY	CAT	IDENTIFYING NO	PART OR NOMENCLATURE OR DESCRIPTION	PARTS LIST
2	CG	7X3387	1/4 NPT SAMPLING VALVE		60
2	CG	5P4675	1/2 TO 1/4 NPT FITTING		59
2	CG	5P4674	3/4 TO 1/2 STOR FITTING		58
2	CG	3E7423	-8 MALE TO -8 ORING BOSS		57
2	CG	6V8942	-12 FEMALE SWMEL TO -8 MALE ORFS		56
2	CG	6V8947	-20 FEMALE SWMEL TO -12 MALE ORFS		55
2	CG	7X2429	TEE WITH FEMALE SWMEL ORFS		54
2	CG	6V8955	90° FEMALE SWMEL TO MALE ORFS		53
1	CG	1242125	STRAIGHT HYDRAULIC HOSE END FEMALE SWMEL		52
1	CG	20LOE01	90° FLANGE ELBOW 1 25 ORFS		51
4	CG	8C5868	-6 ORFS TO 25 NPT MALE FITTING		50
2	CG	6V9961	STRAIGHT HYDRAULIC HOSE END FEMALE SWMEL		49
1	CG	949200	90° 4375 STOR (STRAIGHT-THREAD 0-RING) TO -6 ORFS		48
					47
					46
1	CG	6V8734	MALE TO MALE CONNECTOR ORFS		45
1	CG	6V8831	ORFS CAP		44
2	CG	6V9838	TEE WITH FEMALE SWMEL ORFS		43
2	CG	8T1711	45° HYDRAULIC HOSE END FEMALE SWMEL		42
4	CG	6V8852	90° FEMALE SWMEL TO MALE ORFS		41
4	CG	7X3730	STRAIGHT FLANGE MALE ORFS		40
13	CG	8C7312	-10 MALE ORFS TO -10 37° JC		39
13	CG	8T1710	STRAIGHT HYDRAULIC HOSE END FEMALE SWMEL		38
11	CG	8T1713	90° HYDRAULIC HOSE END FEMALE SWMEL		37
6	CG	16-10 TRLON	-10 MALE TO -16 FEMALE SWMEL ORFS		36
3	CG	16LOE01	90° FLANGE ELBOW, 1 0 ORFS		35
					34
1	CG	50925K381	HIGH PRESSURE HEX SOCKET PLUG, 1/4 NPT		33
1	CG	16SPGCG50R8	FLANGE SPACER WITH GAGE PORTS		32
4	CG	8T9377	SPLIT FLANGE BOLT 3/8-14 x 2.25		31
-1	SAFETY	CG	PART OR NOMENCLATURE OR DESCRIPTION	MATERIAL/SPECIFICATION OR VENDOR NAME	ITEM NO

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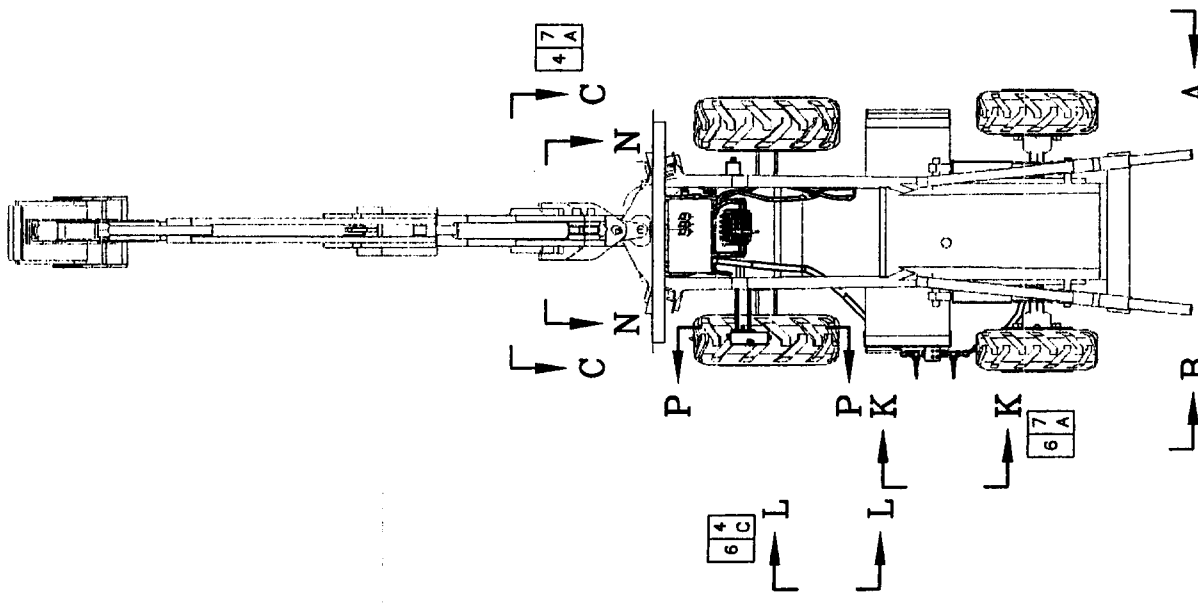
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REQUESTOR S.A. DAWES		DESIGN B. CROWDER		SURFACE FINISHNESS 125	
DRAWING <i>excavator foundation</i> / BLISSA		PROJECT NO 021052		DIMENSIONS X - ± 1 Y - ± 0.01 Z - ± 0.01	
SPEC CODE		TOLERANCES		TOLERANCES X - ± 1 Y - ± 0.01 Z - ± 0.01	
FOR REVIEW/APPROVAL SIGNATURES		REVISIONS		REVISIONS X - ± 1 Y - ± 0.01 Z - ± 0.01	
SEE OUR NO. 9.3145		FRACTIONS		FRACTIONS X - ± 1 Y - ± 0.01 Z - ± 0.01	
EFFECTIVE DATE 07/11/2002		DO NOT SCALE DRAWING		DO NOT SCALE DRAWING	
SCALE NONE		APPLICATION		APPLICATION	
SIZE CASE CODE		BUSH		BUSH	
D 01MF3		NEXT LASY		NEXT LASY	
NET CODE NUMBER		REV		REV	
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SHEET 1 OF 11		SHEET 1 OF 11		SHEET 1 OF 11	



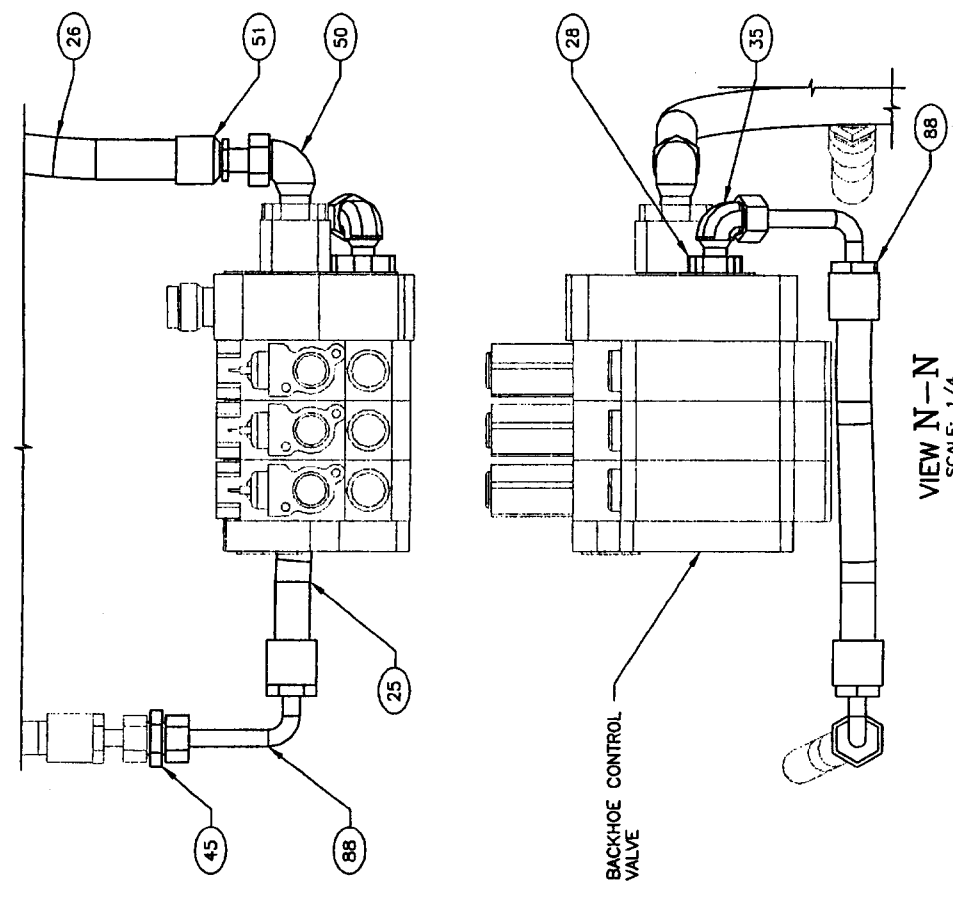
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519868-1  
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XREF DRAWINGS  
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A B

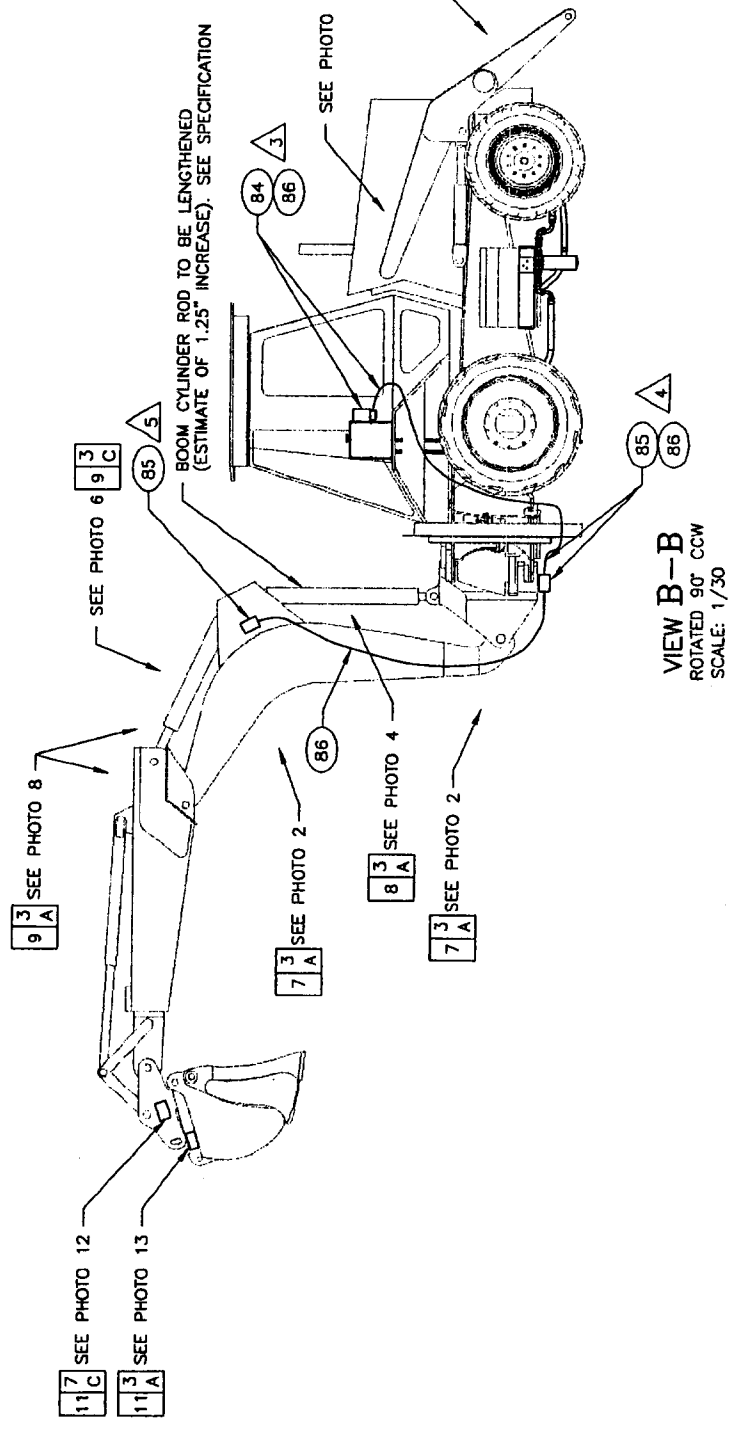
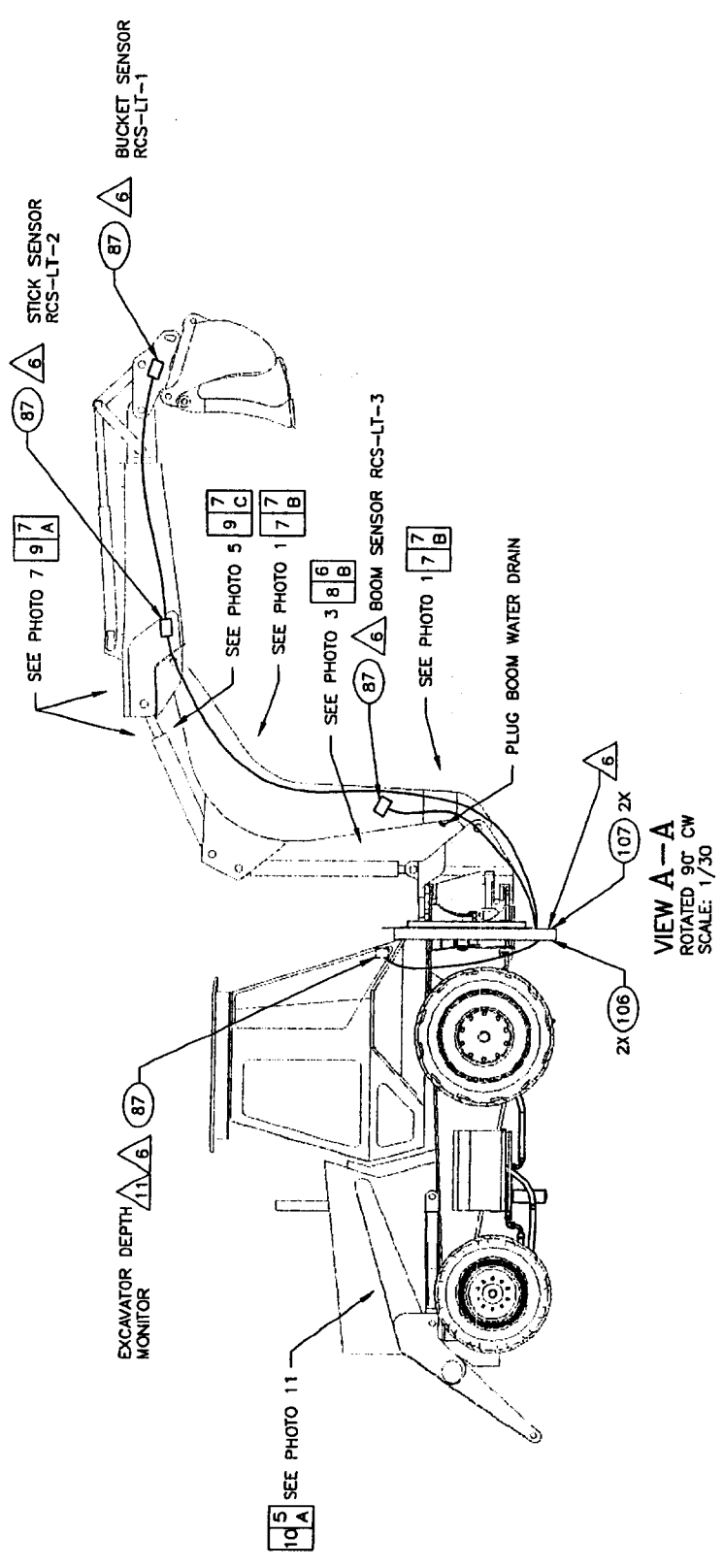
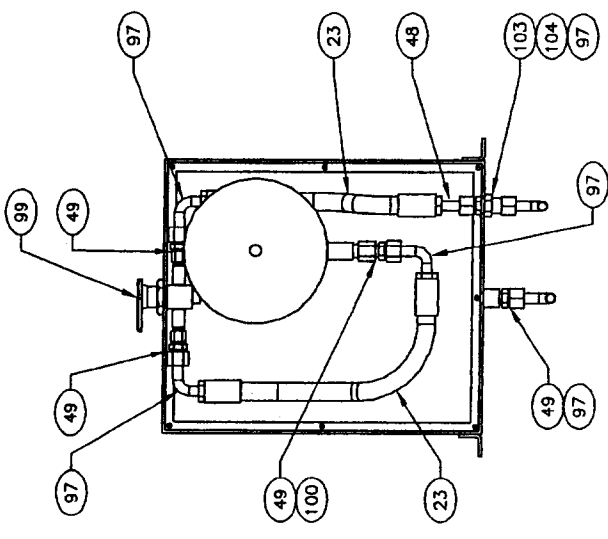
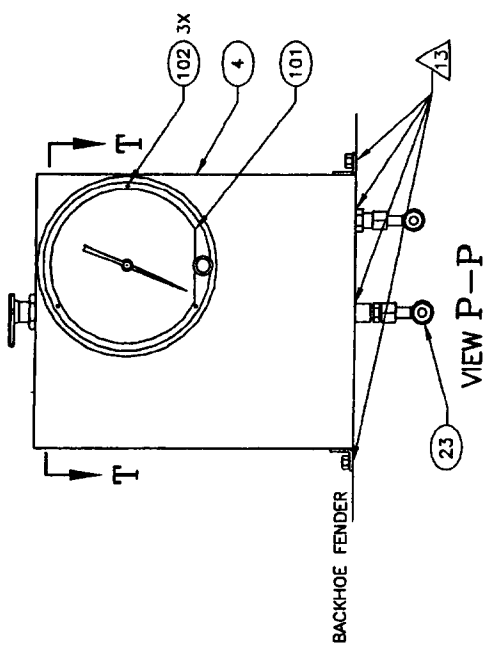
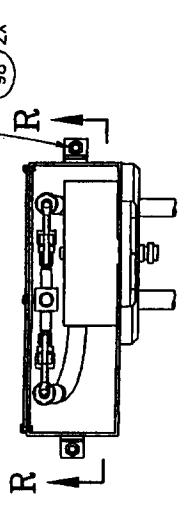


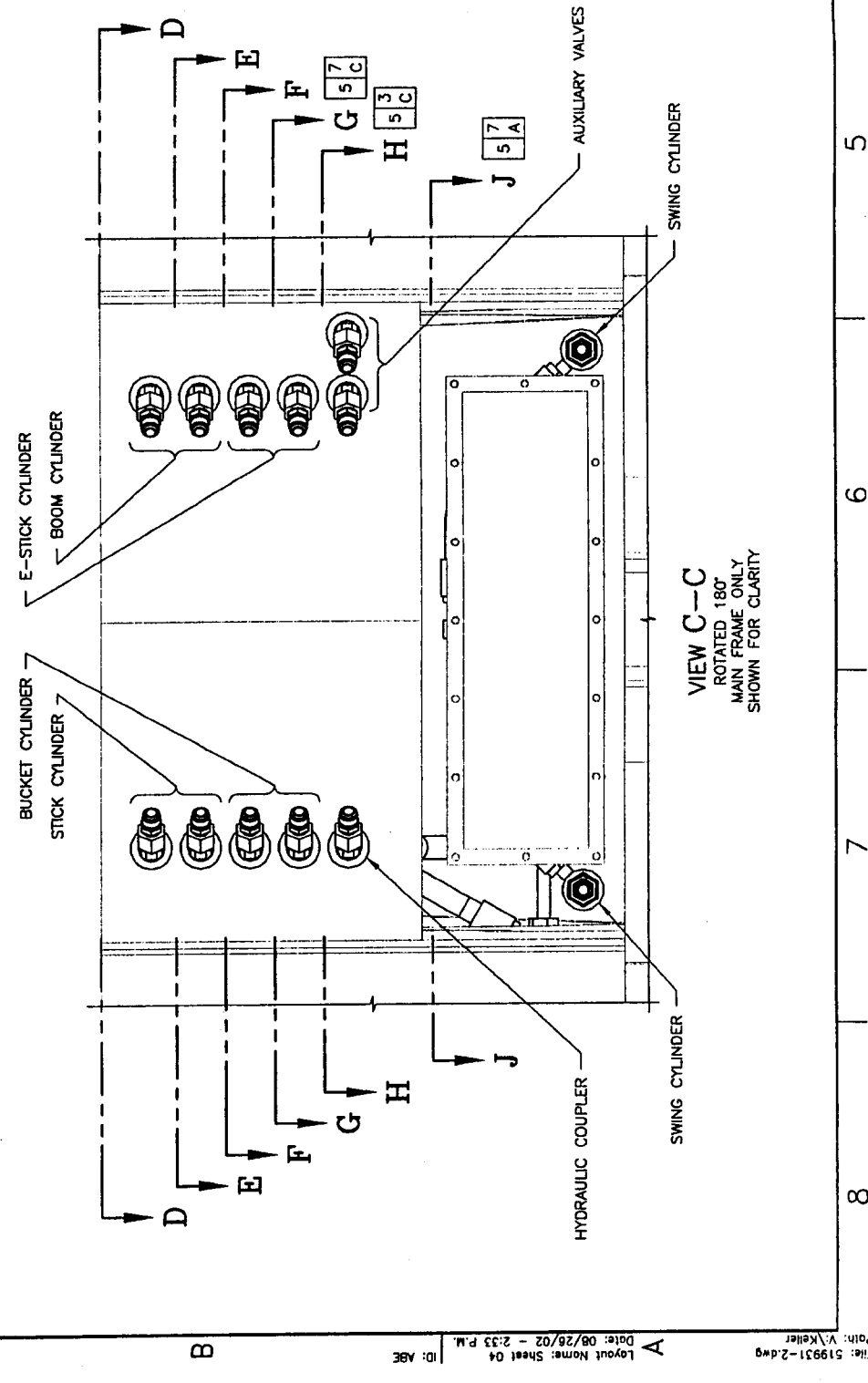
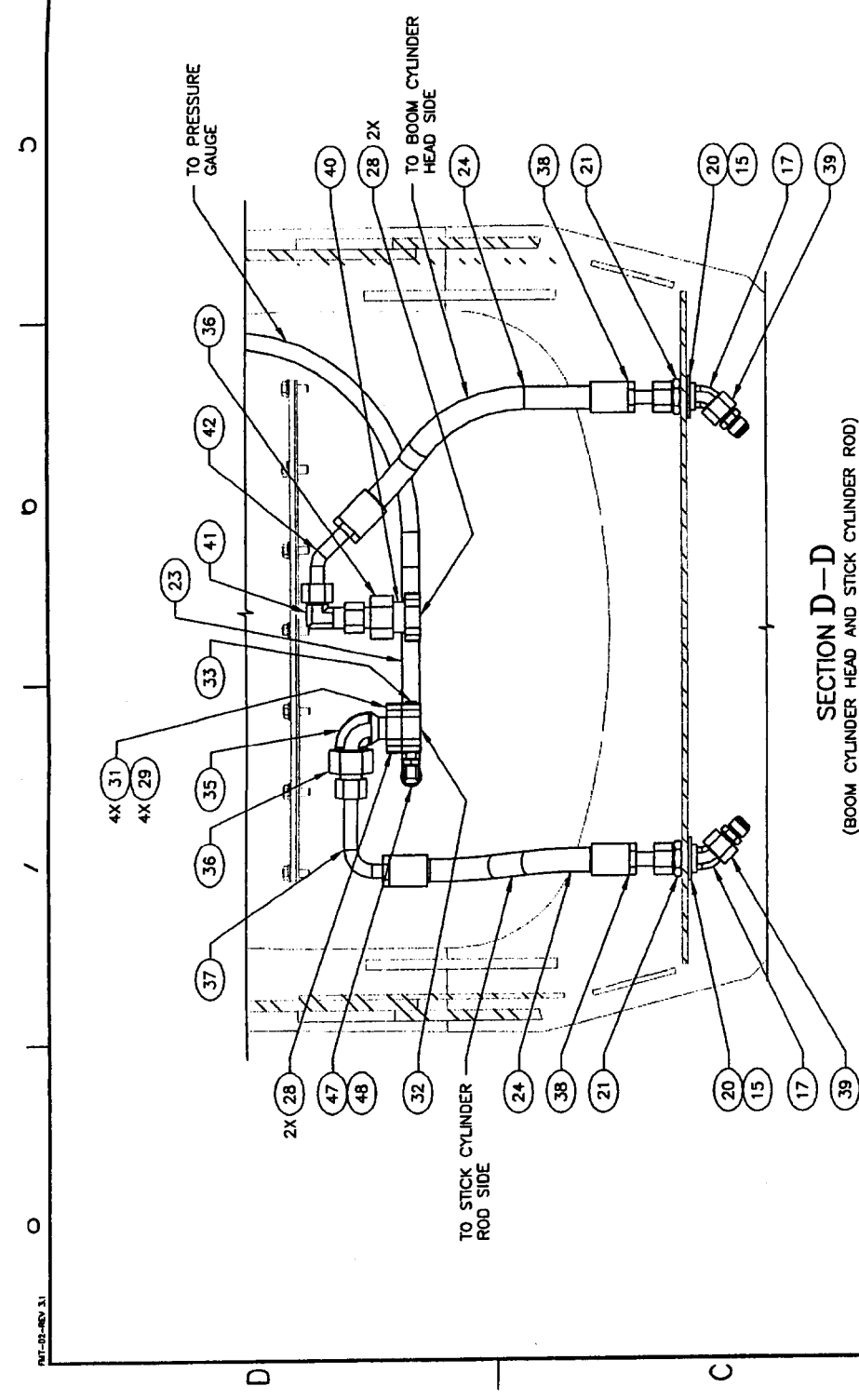
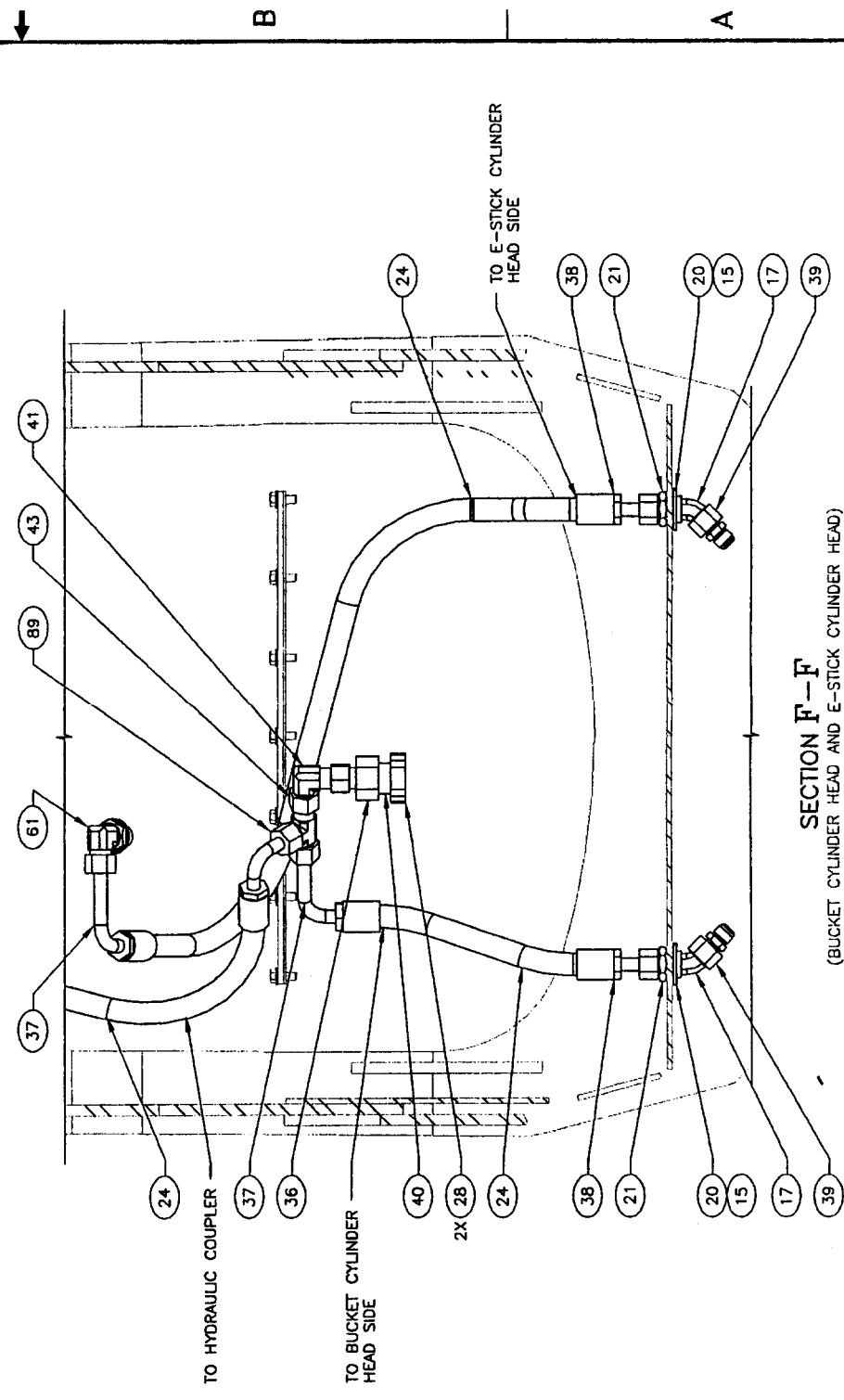
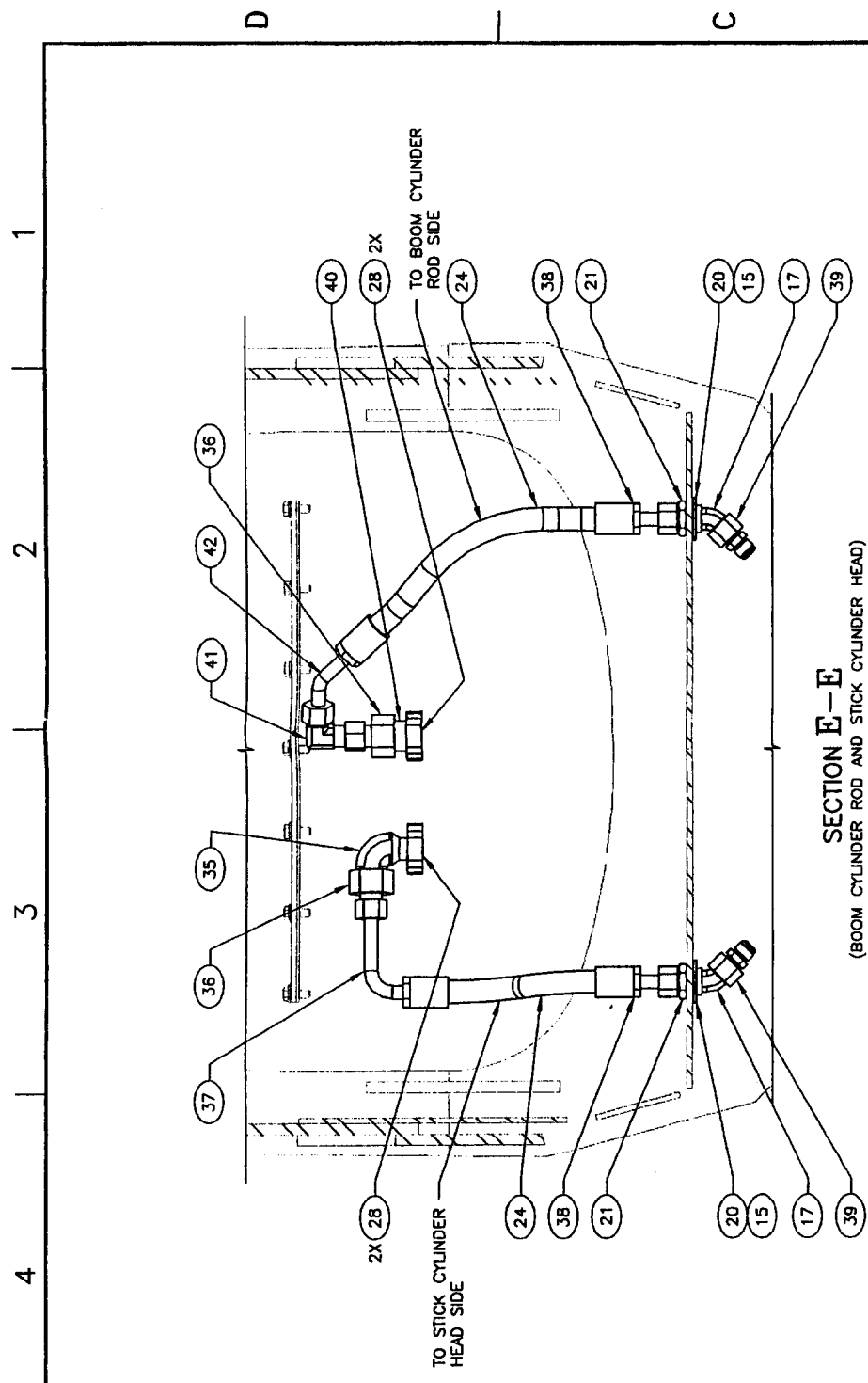
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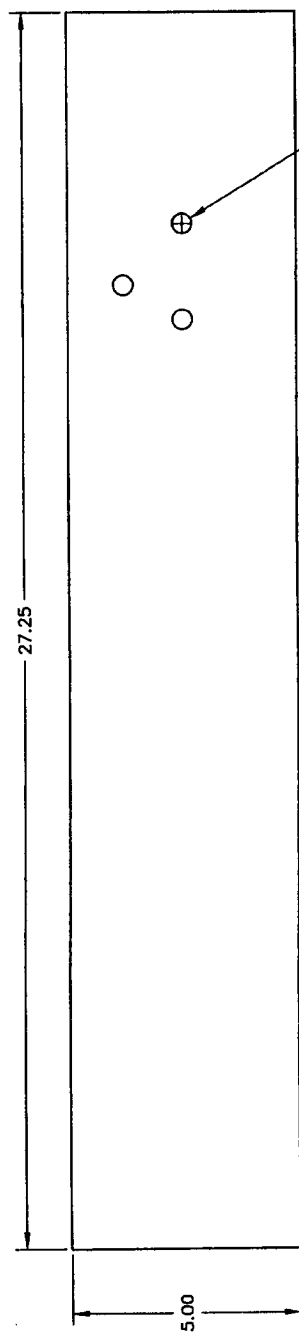
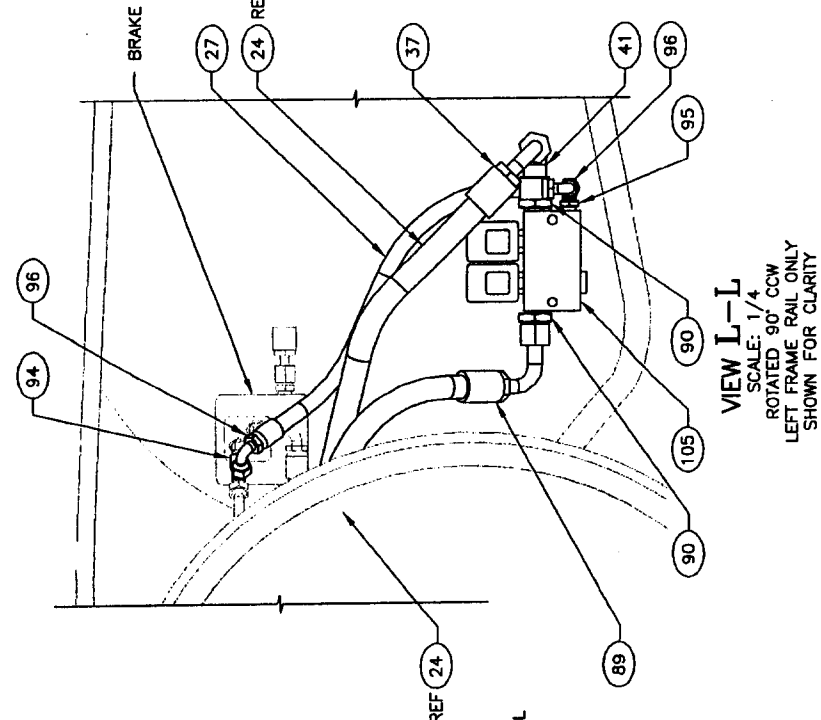
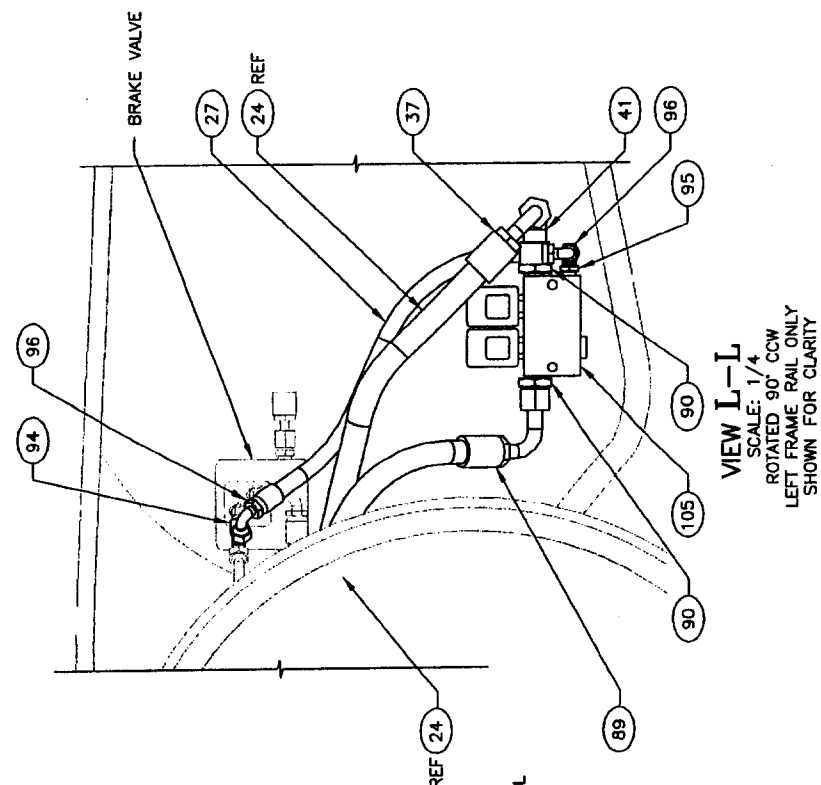
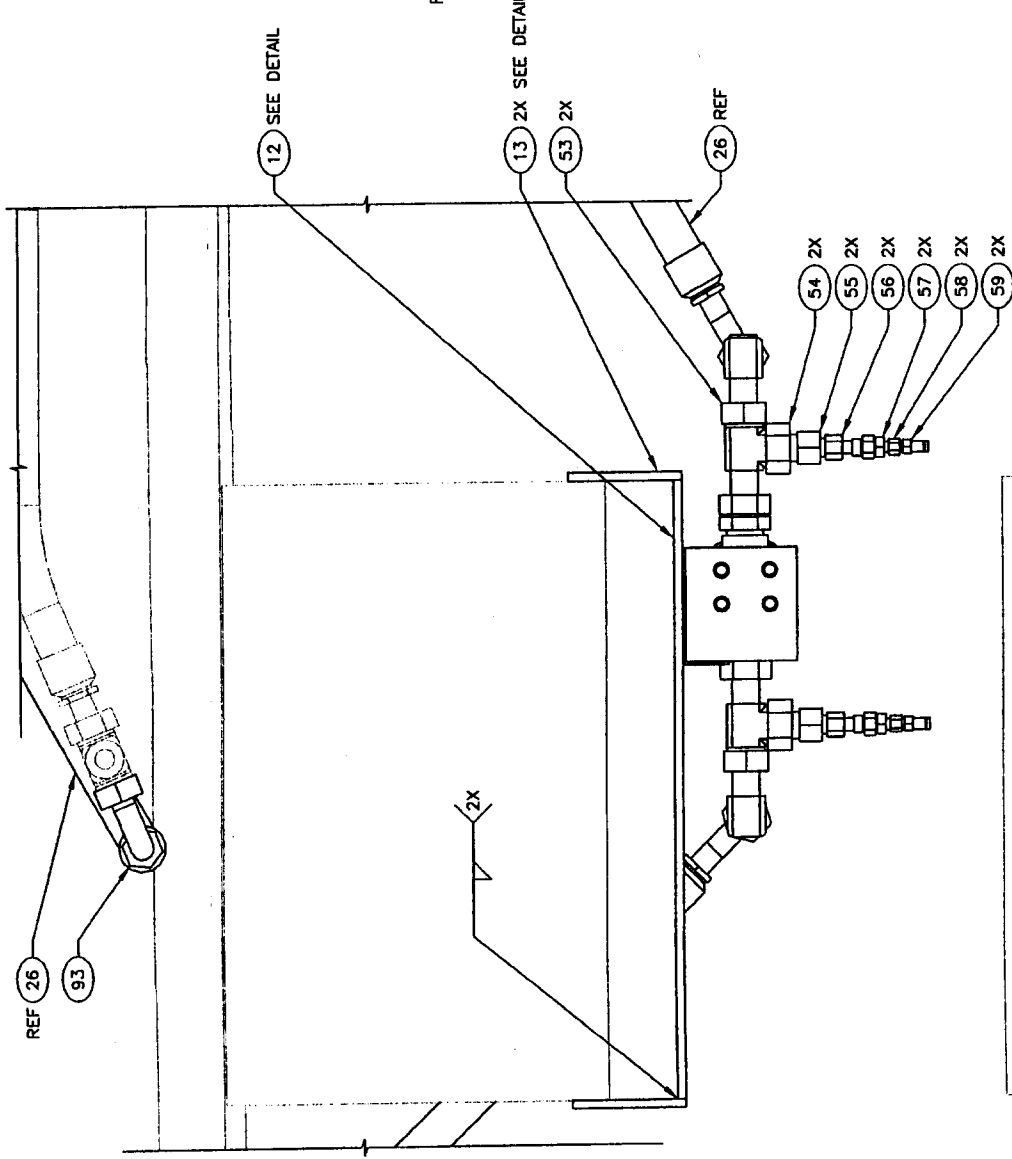


VIEW N-N  
SCALE: 1/4  
ROTATED 180°  
BACKHOE CONTROL VALVE, HYD. SUPPLY AND RETURN ONLY  
SHOWN FOR CLARITY

AR	CG		WELD FILLER METAL	ERTOS-X	AMS A5.18	109
AR	CG		WELD FILLER METAL	E7/T-8	AMS A5.20	108
2	CG	CM B 8151-0	FIELD WIREABLE CONNECTOR FEMALE	TRUCK		107
2	CG	CM BS 8151-0	FIELD WIREABLE CONNECTOR MALE			106
1	CG	40311	PIN VALVE	PART OF WOODS MAIN ROY ASSY		105
1	CG	8V8994	BULKHEAD ORFS MALE UNION, -6	CATERPILLAR		104
1	CG	8V9168	ORFS BULKHEAD NUT, -6	CATERPILLAR		103
3	CG		MACHINE SCREW, FLAT HD, PHILLIPS 1/4-20 UNC-2A X 3/8 LG.	18-B SST	MIL SPEC FT-S-92	102
1	CG	QAM 6" 0-4000 PSI	PRESSURE GAUGE	HEISE		101
1	CG	A-68800-92	PRESSURE SNUBBER, 1/4 NPT	COLE-PARKER INST CO		100
1	CG	SS-H83PFA	VALVE	SWAGELOK		99
2	CG		WASHER, LOCK, 3/8 HEAVY DUTY	ZINC PLATED STEEL	ASME B18.21.1	98
5	CG	8V9963	90° HYDRAULIC HOSE END FEMALE SWIVEL	CATERPILLAR		97
2	CG	1242143	90° HYDRAULIC HOSE END FEMALE SWIVEL			96
1	CG	8V8627	90° ELBOW -4 ORFS TO -6 STOR			95
1	CG	8V9835	TEE, -4 MALE, MALE FEMALE SWIVEL			94
3	CG	1242157	90° HYDRAULIC HOSE END FEMALE SWIVEL			93
2	CG		NUT, HEX 3/8-16 UNC-2B	CS, GRADE 5 ZINC PLATED STEEL	ASME B18.2.2	92
2	CG		BOLT, HEX HD 3/8-16 UNC-2A X 1 LG.	CS, GRADE 5 ZINC PLATED STEEL	SAE J429	91
2	CG	8C6758	-10 ORFS TO -6 STOR BOSS			90
2	CG	8T1712	90° HYDRAULIC HOSE END FEMALE SWIVEL	CATERPILLAR		89
2	CG	8V9976	-16 90° HYDRAULIC HOSE END FEMALE SWIVEL			88
1	CG	OC107	EXCAVATOR BUCKET POSITION MONITOR	OCALA INSTRUMENTS		87
AR	CG	700901	NYLON TUBE, 10,000 PSIG 1/8 ID X 5/16 OD	LINCOLN INDUSTRIAL		86
2	CG	619266482	SSV DIVIDER VALVE, 12 PORT			85
1	CG	94812	ELECTRIC GREASE PUMP 1616 CAPACITY, 12V-3.5A, 3600 PSIG			84
AR	CG	1602245	NYLON ABRASION SLEEVE, 1 1/4"	CATERPILLAR		83
1	CG	0050658	-12 STOR TO -10 JIC			82
12	CG	2P7636	-8 STOR TO -10 JIC			81
3	CG	8J5458	LOCK CHECK VALVE			80
2	CG	0307964	-10 JIC TO -10 JIC 45° ELBOW			79
7	CG	5P1945	-12 JIC TO -12 JIC			78
7	CG	8C7313	-12 ORFS TO -12 JIC			77
1	CG	8K6686	-10 STOR TO -10 JIC 90° ELBOW			76
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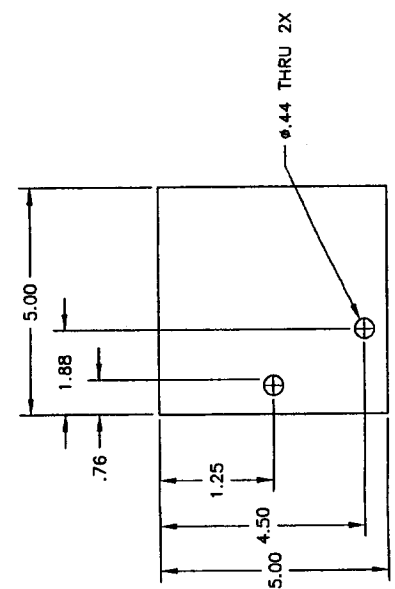






12 DETAIL  
SCALE: 1/2

12 DETAIL  
SCALE: 1/2



13 DETAIL  
SCALE: 1/2

15 DETAIL  
SCALE: 1/1

VIEW K-K  
SCALE: 1/4  
ROTATED 90° CCW  
RIGHT FRAME RAIL AND BATTERY BOX ONLY  
SHOWN FOR CLARITY

VIEW L-L  
SCALE: 1/4  
ROTATED 90° CCW  
LEFT FRAME RAIL ONLY  
SHOWN FOR CLARITY

SIZE	CAD CODE	INDEX CODE NUMBER	REV
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SCALE NOTED			SHEET 6